PIAGGIO

WORKSHOP MANUAL

633574

Beverly 250 USA

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WORKSHOP MANUAL
Beverly 250 USA

This workshop manual has been drawn up by Piaggio & C. Spa to be used by the workshops of Piaggio-Gilera dealers. This manual is addressed to Piaggio service mechanics who are supposed to have a basic knowledge of mechanics principles and of vehicle fixing techniques and procedures. Any important changes made to the vehicles or to specific fixing operations will be promptly reported by updates to this manual. Nevertheless, no fixing work can be satisfactory if the necessary equipment and tools are unavailable. It is therefore advisable to read the sections of this manual relating to specific tools, along with the specific tool catalogue.

N.B. Provides key information to make the procedure easier to understand and carry out.

CAUTION Refers to specific procedures to carry out for preventing damages to the vehicle.

WARNING Refers to specific procedures to carry out to prevent injuries to the repairer.

Personal safety Failure to completely observe these instructions will result in serious risk of personal injury.

Safeguarding the environment Sections marked with this symbol indicate the correct use of the vehicle to prevent damaging the environment.

Vehicle intactness The incomplete or non-observance of these regulations leads to the risk of serious damage to the vehicle and sometimes even the invalidity of the guarantee.

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INDEX OF TOPICS

CHARACTERISTICS	CHAR

Rules

This section describes general safety rules for any maintenance operations performed on the scooter.

Safety rules

- If work can only be done on the scooter with the engine running, make sure that the premises are well ventilated, using special extractors if necessary; never let the engine run in an enclosed area. Exhaust fumes are toxic.
- The battery electrolyte contains sulphuric acid. Protect your eyes, clothes and skin. Sulphuric acid is highly corrosive; in the event of contact with your eyes or skin, rinse thoroughly with water and seek immediate medical attention.
- The battery produces hydrogen, a gas that can be highly explosive. Do not smoke and avoid sparks or flames near the battery, especially when charging it.
- Fuel is highly flammable and under certain conditions can be explosive. Do not smoke in the working area, and avoid open flames or sparks.
- Clean the brake pads in a well ventilated area, directing the jet of compressed air in such a way that you do not breathe in the dust produced by the wear of the friction material. Even though the latter contains no asbestos, dust inhalation is harmful.

Maintenance rules

- Use original PIAGGIO spare parts and lubricants recommended by the Manufacturer. Non-original or non-conforming spares may damage the scooter.
- Use only the appropriate tools designed for this scooter.
- Always use new gaskets, sealing rings and split pins upon reassembly.
- After removal, clean the components using non-flammable or low flash-point solvent. Lubricate all the work surfaces before reassembly except the tapered couplings.
- After reassembly, make sure that all the components have been installed correctly and work properly.
- Use only equipment with metric sizes for removal, service and reassembly operations. Metric bolts, nuts and screws are not interchangeable with coupling members using English measurements. Using unsuitable coupling members and tools may damage the scooter.
- When carrying out maintenance operations on the scooter that involve the electrical system, make sure the electrical connections have been made properly, particularly the ground and battery connections.

Vehicle identification

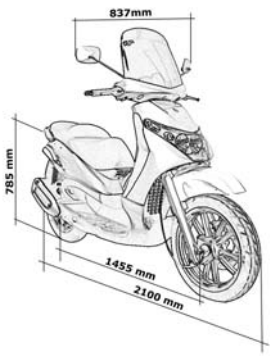
VEHICLE IDENTIFICATION

Specification	Desc./Quantity
Chassis prefix	ZAPM 289 L36S
Engine prefix	M285M÷1001

Dimensions and mass

WEIGHTS AND DIMENSIONS

Specification	Desc./Quantity
Kerb weight in running order	149 kg
Width (over mirrors)	837 mm
Length	2100 mm
Wheelbase	1455 mm
Saddle height	785 mm



Engine

ENGINE

Specification	Desc./Quantity
Engine type	Single-cylinder, four-stroke, four-valve, liquid-cooled.
Timing system	Single overhead camshaft driven by chain on left side, three-arm rockers with threaded adjuster.
Bore x stroke	72 x 60 mm
Cubic capacity	244.29 cm³
Compression ratio	10.5 - 11.5 : 1
Keihin carburettor	CVEK-30
Carburatore Walbro	WVF-7S*
Idle speed	1650 ± 50 rpm
CO adjustment	3,8 ± 07%
Air filter	Sponge-type damped with a 50% Selenia Air Filter Oil - 50% unleaded petrol mixture
Starter System	Electric starter motor
Lubrication	engine lubrications with lobe pump (inside crankcase) controlled by a chain with double filter:

Specification	Desc./Quantity
	gauze and paper filter.
Fuel supply	with unleaded petrol; carburettor and vacuum pump.
Maximum power (to the crankshaft) 125	11 Kw (15CV) at 9750 rpm.
Top speed	124 Km/h

**The identification marking may change whenever the carburettor is updated*

Transmission

TRASMISSION

Specification	Desc./Quantity
Transmission	Expanding pulley type automatic speed variator with torque server, V-belt, ventilated automatic centrifugal dry clutch, automatic fan, gear reduction unit and transmission casing with forced air circulation cooling.

Capacities

CAPACITIES

Specification	Desc./Quantity
Engine oil	~ 1200 cc
Petrol tank	approx. 10 l (including reserve approx. 2.5 l)
Rear hub oil	250 cc

Electrical system

ELECTRICAL SYSTEM

Specification	Desc./Quantity
Ignition type	Electronic with capacitive discharge (CDI) and variable advance with separate HT coil.
Ignition advance (before T.D.C)	10° ± 1 at 2000 rpm. 28° ± 1 at 6500 rpm.
Spark plug	CHAMPION RG 4 HC
Battery	12V-12Ah
Fuses	N° 2 15A, N°1 10A, N° 2 7,5A, N° 3 4A
Generator	AC current

Frame and suspensions

FRAME AND SUSPENSIONS

Specification	Desc./Quantity
Type	Welded steel pipes with pressed sheet metal reinforcements.
Front suspension	Hydraulic telescopic fork with advanced pivot and 35 mm stem
Max. front fork travel	104 mm
Rear suspension	Engine with swinging fork attached to frame by means of an arm with 2 degrees of freedomPair of double-acting hydraulic shock absorbers and coaxial springs with preloading adjustment in four positions.
Max. rear shock absorber travel	95.5 mm

Brakes

BRAKES

Specification	Desc./Quantity
Front brake	Disc brake, diameter 260 mm and floating calliper with twin plungers and hydraulic control (lever on the far right of the handlebar)
Rear brake	Disc brake, diameter 260 mm and calliper with two counteracting plungers and hydraulic control (lever on the far left of the handlebar)

Wheels and tyres

WHEELS AND TYRES

Specification	Desc./Quantity
Front wheel rim	Light alloy, 3.00 x 16"
Rear wheel rim	Light alloy, 3.50 x 16"
Front tyre	110/70-16" M/C 52P Tubeless
Rear tyre	140/70-16" M/C 65P Tubeless
Front wheel tyre pressure (when cold)	2.1 bar
Rear wheel tyre pressure (when cold)	2.3 bar
Rear wheel tyre pressure (with driver and passenger) (when cold)	2.5 bar

N.B.

CHECK AND ADJUST TYRE PRESSURE WITH TYRES AT AMBIENT TEMPERATURE. REGULATE PRESSURE ACCORDING TO THE WEIGHT OF THE RIDER AND ACCESSORIES.

Secondary air

The working principle of the SAS for Quasar 250 cc Euro 2 engines is entirely similar to the SAS employed on 2-stroke engines. The main differences are the following:

Secondary air enters directly into the exhaust duct on the cylinder head, instead of entering through the exhaust pipe as in two-stroke engines.

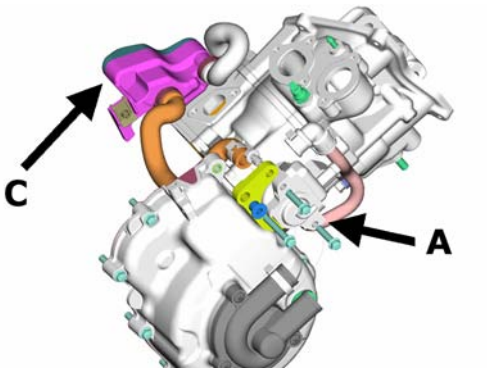
The reed valve found on 2-stroke engines is here replaced by a membrane.

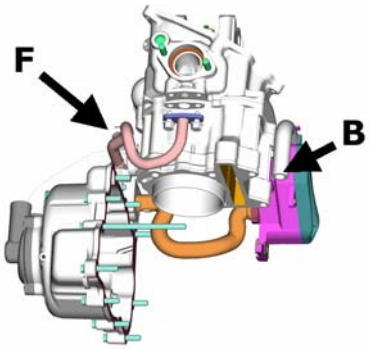
Unit «**A**», shown in the figure, is provided with a cut-off connected to the vacuum inlet on the intake manifold to shut air inlet during deceleration, so to prevent detonations in the silencer. Air is sucked in through hole «**B**» and flows inside the duct into air-box «**C**» where it is filtered by filtering element «**D**».

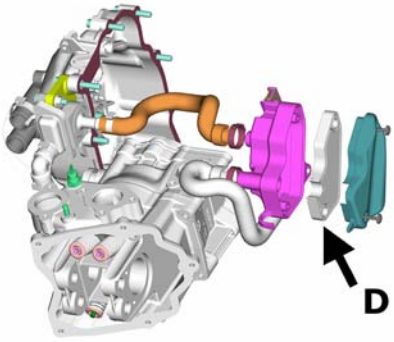
The filtered air now enters membrane device «**A**», through duct «**E**» and is then guided towards the head.

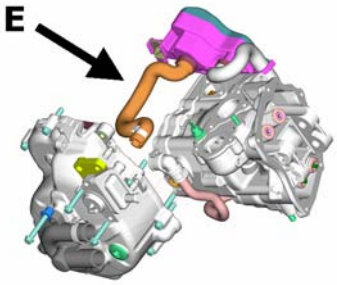
Flowing through pipe «**F**», flanged to the head, secondary air reaches the exhaust duct thus providing oxygen addition to the unburnt gases just before they enter the catalytic converter.

The efficiency of the catalyzing process is therefore increased.









Carburettor

250cc Version

Keihin

KEIHIN CARBURETTOR

Specification	Desc./Quantity
Depression type	CVEK30
Printing on the body	CVK
CUT-OFF device	Present
Max jet	100
Minimum jet	38
Max air jet	70
Minimum air jet	115
Idle mixture adjustment screw initial opening	2½ ± ¼
Conical pin	Ø 2,530
Emulsifier nozzle	Ø 2,8
Starter air jet	Ø 1,5
Starter jet	42
Starter device resistance	~ 20 Ω
Venturi choke	Ø 29
Throttle valve	Ø 30,5
Choke maximum cone	Ø 47

Walbro

WALBRO CARBURETTOR

Specification	Desc./Quantity
Depression type	WVF-7S*
Printing on the body	7S
CUT-OFF device	Present
Max jet	118
Minimum jet	34
Max air jet	150
Minimum air jet	31
Gas valve spring	120 gr
Idle mixture adjustment screw initial opening	3 ± ½
Conical pin	465

Specification	Desc./Quantity
Conical pin top notches	3
Emulsifier nozzle	Ø 2,7
Choke maximum cone	Ø 1,5
Starter air jet	200
Starter emulsifier jet	130
Starter jet	50
Starter pin diameter	Ø 1,78
Starter device resistance	~ 40 Ω
Choke	Ø 29 (30,3x27,0)
Throttle valve	Ø 33
Choke maximum cone	Ø 48,0

**The identification marking may change whenever the carburettor is updated*

Tightening Torques

STEERING

Name	Torque in Nm
Upper steering ring nut	30 ÷ 36
Lower steering ring nut	10 ÷ 13 then loosen by 90°
Handlebar clamping screw*	45 ÷ 50
Handlebar control assembly u-bolts clamping screws	7 ÷ 10

FRAME ASSEMBLY

Name	Torque in Nm
Swing arm pivot - engine	64 ÷ 72
Frame-swingarm pivot nut	64 ÷ 72
Spacer clamping threaded bushing	13 ÷ 17
Spacer clamping threaded bushing counternut	90 ÷ 110
Frame arm-engine arm link nut	33 ÷ 41
Silentbloc support plate bolt	64 ÷ 72
Centre-stand bolt	25 ÷ 30
Side stand fixing bolt	35 ÷ 40
Sidestand switch screw	5 ÷ 7

FRONT SUSPENSION

Name	Torque in Nm
Retaining screw for pumping elements to lower fork plate	20 ÷ 25
Front wheel axle	45 - 50
Fork leg screw	6 ÷ 7
Retaining screw for front mudguard to plate	4.5 ÷ 7
Retaining screw for mudguard frame to fork	9 ÷ 11

FRONT BRAKE

Name	Torque in Nm
Brake fluid pump - hose fitting	16 ÷ 20
Brake fluid tube - calliper fitting	16 ÷ 20
Tightening screw for calliper to the fork	20 ÷ 25
Disc tightening screw (°)	5 ÷ 6
Oil bleed screw	12 ÷ 16
Pad fastening pin	19.6 ÷ 24.5

REAR SUSPENSION

Name	Torque in Nm
Left-hand lower shock absorber support bolt	20 ÷ 25
Shock absorber top mounting	33 - 41
Shock absorber bottom mounting	33 - 41
Rear gear shaft	104 - 126
Retaining screw for wheel rim to hub	34 ÷ 38
Screw - muffler support arm to engine (*)	20 ÷ 25

REAR BRAKE

Name	Torque in Nm
Brake fluid pump - hose fitting	16 ÷ 20
Brake fluid tube - calliper fitting	16 ÷ 20
Hose/rigid tube oil connection	9 ÷ 11
Rear disc clamping bolt	11 ÷ 13
Oil bleed screw	12 ÷ 16
Screw tightening calliper to the support	20 ÷ 25
Retaining screw for rear brake calliper support to engine	20 ÷ 25
Pad clamping pin	20 ÷ 25

EXAUST PIPE

Name	Torque in Nm
Screw clamping manifold to silencer	15,5 ÷ 18,5
Screw clamping heat shield to silencer	5 ÷ 6
Exhaust gas intake screw	22 ÷ 26
Screw fixing silencer support arm to crankcase	33 ÷ 41
Nut for fixing muffler to the support arm	27 ÷ 30
Retaining nut for muffler to cylinder head	16 ÷ 18

ENGINE - LUBRICATION

Name	Torque in Nm
Hub oil exhaust cap	15 ÷ 17
Oil filter on the crankcase fitting	27 ÷ 33
Engine oil drainage tap/gauze filter	24 ÷ 30
Oil filter	4 ÷ 6
Oil pump cover screws	0.7 - 0.9
Screws mounting the oil pump to the crankcase	5 - 6
Oil pump command crown screw	10 ÷ 14
Oil pump cover plate screws	4 ÷ 6
Oil sump screws	10 ÷ 14
Minimum oil pressure sensor	12 - 14

CYLINDER HEAD

Name	Torque in Nm
Spark plug	12 - 14
Cylinder head cover screw (1) (^)	9 ÷ 11 + 180°
Head fastening side screws	11 ÷ 13
Starter ground screw	7 ÷ 8.5
Tappet adjustment lock nut	6 ÷ 8
Timing chain tensioner pad screw	10 ÷ 14
Start up counterweight support screw	11 ÷ 15
Timing chain tightener support screw	11 ÷ 13
Timing chain tensioner central screw	5 ÷ 6
Camshaft retention plate screw	4 ÷ 6

TRANSMISSION

Name	Torque in Nm
Belt support roller screw	11 ÷ 13
Clutch assembly nut on driven pulley	45 ÷ 50

Name	Torque in Nm
drive pulley nut	75 ÷ 83
Transmission cover screw	11 ÷ 13 Nm
Driven pulley shaft nut	54 ÷ 60
Hub cover screws	24 - 27

FLYWHEEL

Name	Torque in Nm
Flywheel cover fastening	5 ÷ 6
Stator assembly screws (°)	3 ÷ 4
Flywheel nut	94 - 102 N.m
Pick-Up fixing screws	3 ÷ 4
freewheel mounting screws on the flywheel	13 - 15

ENGINE CRANKCASE AND SHAFT

Name	Torque in Nm
Internal engine crankcase bulkhead (transmission-side half shaft) screws	4 ÷ 6
Engine crankcase coupling screws	11 - 13
Starter screws	11 - 13
Crankcase timing cover screws	3,5 ÷ 4,5

COOLING

Name	Torque in Nm
Water pump rotor cover	3 ÷ 4
Screws of the water pump rotor driving link	3 ÷ 4
Thermostat cover screws	3 ÷ 4
Bleed screw:	3

(°) Apply threadlocking LOCTITE medium, type 242.

(*) Tighten the two screws after tightening the rear wheel spindle nut with the prescribed torque.

Safety tightenings: refer to "Predelivery Operations".

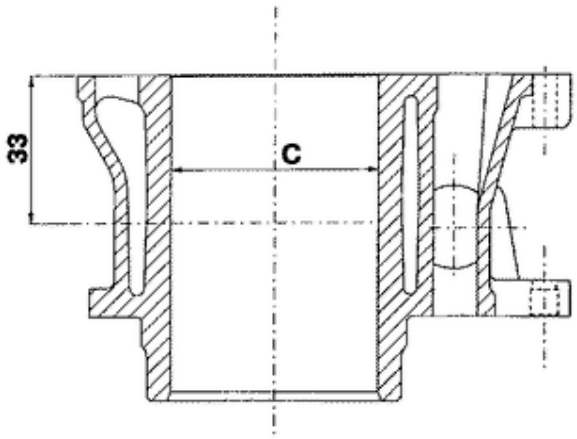
(^)Tighten the nuts in two phases, following a crosswise pattern.

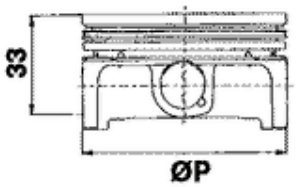
(1) Lubricate nuts with engine oil before fitting.

Overhaul data

Assembly clearances

Cylinder - piston assy.

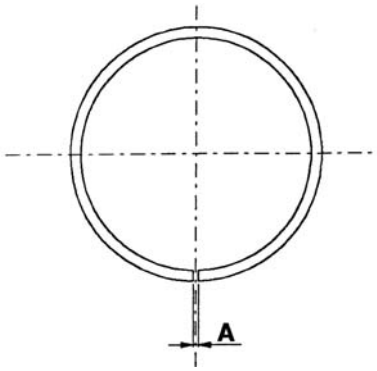




CATEGORIES COUPLING

Name	Play	Initials	Cylinder	Piston	Play on fitting
Cylinder	72 +0,018 - 0,010	A	71,990 ÷ 71,997	71,953 ÷ 71,960	0,030 - 0,044
Cylinder	72 +0,018 - 0,010	B	71,997 ÷ 72,004	71,960 ÷ 71,967	0,030 - 0,044
Piston	71,967 ±0,014	C	72,004 ÷ 72,011	71,967 ÷ 71,974	0,030 - 0,044
Piston	71,967 ±0,014	D	72,011 ÷ 72,018	71,974 ÷ 71,981	0,030 - 0,044

Piston rings



UPRATING TABLE MOTOR

Name	Description	Dimensions	Initials	Quantity
Compression lining		72 x 1,5	A	0,15 ÷ 0,30
Scraper ring lining		72 x 1	A	0,20 ÷ 0,40
Scraper ring lining		72 x 2,5	A	0,20 ÷ 0,40

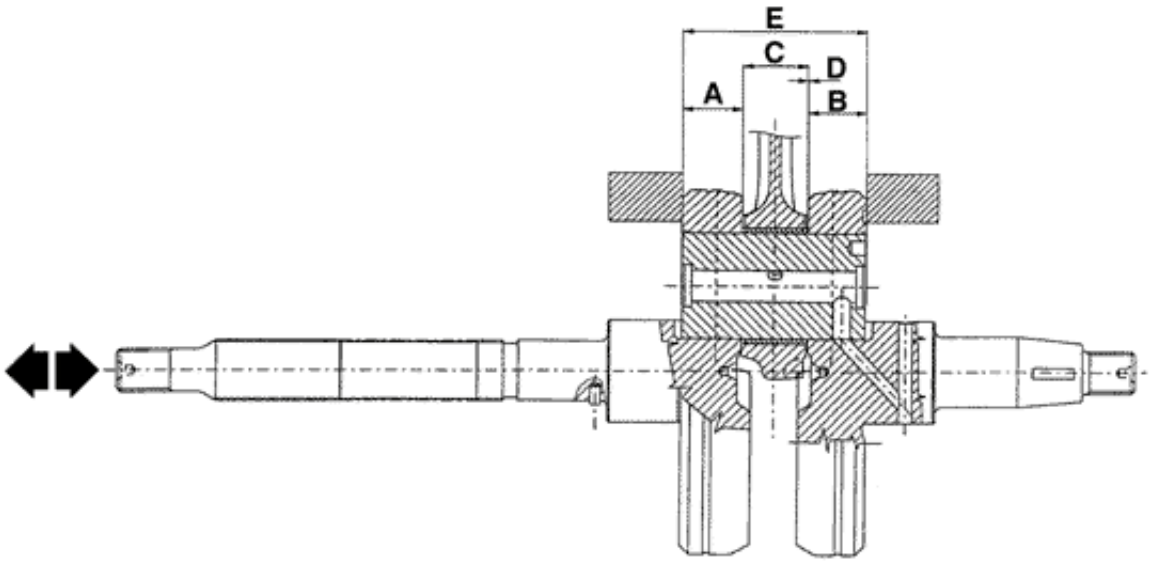
Crankcase - crankshaft - connecting rod

CRANKCASE - DRIVING SHAFT - BENCH HALF BEARINGS

Name	Description	Dimensions	Initials	Quantity
Half crankshaft bearing			Type A - red	1,970 ÷ 1,973
Half crankshaft bearing			Type B - blue	1,973 ÷ 1,976
Half crankshaft bearing			Type C - yellow	1,976 ÷ 1,979
Crankshaft category 1 - Crankcase category 1			C - C	
Crankshaft category 1 - Crankcase category 2			B - B	
Crankshaft category 2 - Crankcase category 1			B - B	
Crankshaft category 2 - Crankcase category 2			A - A	
Crankshaft			category 1	28,998 ÷ 29,004
Crankshaft			category 2	29,004 ÷ 29,010
Carter			category 1	32,959 ÷ 32,965
Carter			category 2	32,953 ÷ 32,959

Fitting clearance

Driving shaft /case axial clearance: Standard clearance 0,15 ÷ 0,40 mm (cold engine)



AXIAL CLEARANCE BETWEEN CRANKSHAFT/CRANKCASE

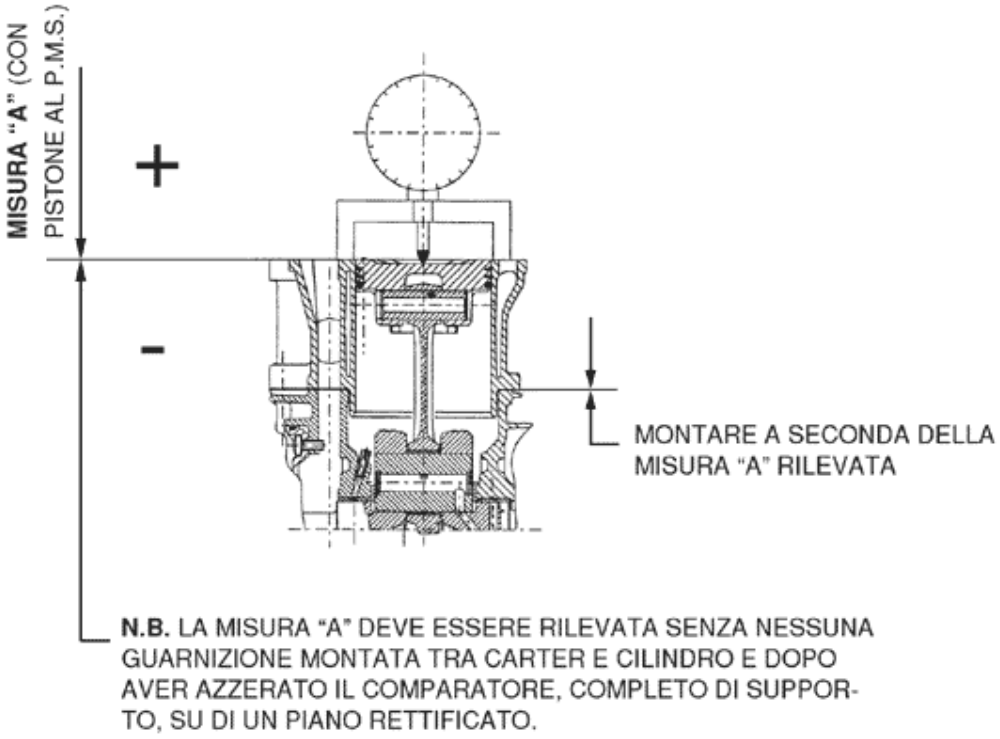
Name	Description	Dimensions	Initials	Quantity
Transmission side half shaft		16.6 +0-0.05	A	D = 0.20 - 0.50
Flywheel side half shaft		16.6 +0-0.05	B	D = 0.20 - 0.50
Connecting rod		18 -0.10 -0.15	C	D = 0.20 - 0.50
Spacer tool		51.4 +0.05	E	D = 0.20 - 0.50

Slot packing system

Characteristic

Compression ratio

10.5 - 11.5 : 1


MISURA "A" (CON PISTONE AL P.M.S.)
+
-
MONTARE A SECONDA DELLA MISURA "A" RILEVATA
N.B. LA MISURA "A" DEVE ESSERE RILEVATA SENZA NESSUNA GUARNIZIONE MONTATA TRA CARTER E CILINDRO E DOPO AVER AZZERATO IL COMPARATORE, COMPLETO DI SUPPORTO, SU DI UN PIANO RETTIFICATO.

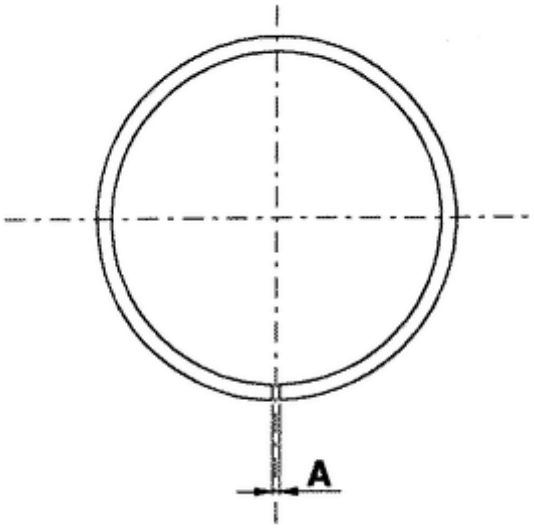
N.B.

MEASUREMENT "A" TO BE TAKEN IS A VALUE OF PISTON RE-ENTRY, IT INDICATES BY HOW MUCH THE PLANE FORMED BY THE PISTON CROWN FALLS BELOW THE PLANE FORMED BY THE TOP OF THE CYLINDER. THE FURTHER THE PISTON FALLS INSIDE THE CYLINDER, THE LESS THE BASE GASKET IS TO BE APPLIED (TO RECOVER THE COMPRESSION RATIO) AND VICEVERSA.

SHIMMING

Name	Measure A	Thickness
Shimming	3.70 - 3.60	0.4 ± 0.05
Shimming	3.60 - 3.40	0.6 ± 0.05
Shimming	3.40 - 3.30	0.8 ± 0.05

Oversizes



OVERSIZE

Name	Description	Dimensions	Initials	Quantity
Compression lining 1° greater		57,2 x 1	A	0,15 ÷ 0,30
First uprated scraper ring lining		57,2 x 1	A	0,10 ÷ 0,30
First uprated scraper ring lining		57,2 x 2,5	A	0,15 ÷ 0,35
Second uprated compression lining		57,4 x 1	A	0,15 ÷ 0,30
Second uprated scraper ring lining		57,4 x 1	A	0,10 ÷ 0,30
Second uprated scraper ring lining		57,4 x 2,5	A	0,15 ÷ 0,35
Third uprated compression lining		57,6 x 1	A	0,15 ÷ 0,30
Third uprated scraper ring lining		57,6 x 1	A	0,10 x 30
Third uprated scraper ring lining		57,6 x 2,5	A	0,15 ÷ 0,35

Products

TABLE OF RECOMMENDED PRODUCTS

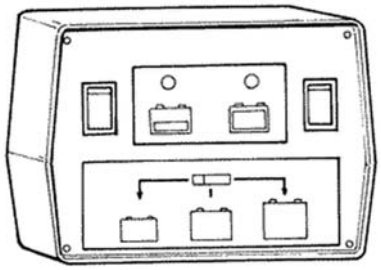
Product	Description	Specifications
TUTELA MATRYX MOTO RIDER	Rear hub oil	SAE 75W/85 API GL4 synthetic multigrade oil
TUTELA TP1	Grease for brake levers, throttle, stand	NLGI 1-2 complex calcium soap base white grease spray

Product	Description	Specifications
SELENIA HI Scooter 4 Tech	Lubricating oil for flexible transmission (gas control)	Oil for 4-stroke engines
TUTELA TOP 4	Brake fluid	SAE J1703, NHTSA 116 DOT 4, ISO 4925 synthetic fluid
PARAFLU MOTO RIDER (Ready to use)	coolant	Mono-ethylene glycol based antifreeze, CUNA NC 956-16 fluid
Selenia Air Filter Oil	Oil for air filter sponge	Mineral oil with special additives to increase the ISO VG 150 adhesiveness
Code PIAGGIO 602683M	Muffler cleaning paste	Specific product for cleaning and polishing stainless steel mufflers.
SELENIA HI Scooter 4 Tech	Engine oil	Synthetic oil SAE 5W/40 that meets the API SG specifications.
TUTELA MRM 2	Grease for the rotating ring of the tone wheel	Molybdenum disulphide and lithium soap grease
TUTELA ZETA 2	Grease for steering bearings, pin seats and swinging arm	Soap-based lithium and zinc oxide NLG12 grease

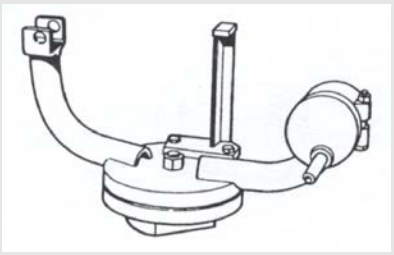
INDEX OF TOPICS

TOOLING	TOOL

SPECIFIC EQUIPMENT

Stores code	Description	
020151Y	Air heater	
020331Y	Digital multimeter	
020333Y	Single battery charger	
020334Y	Multiple battery charger	
001467Y014	Puller for removing 15 mm bearings	

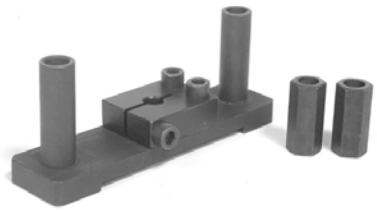
Stores code	Description	
020412Y	15 mm guide	
020335Y	Magnetic support for gauge	
020565Y	Flywheel compasses tool	
020439Y	17 mm guide	
020359Y	42 x 47 mm adaptor	

Stores code	Description	
020363Y	20mm guide	
020459Y	Drift for fitting bearing on steering tube	
020458Y	Puller for lower bearing on steering column	
002095Y	Engine support	
008564Y	Flywheel extractor	

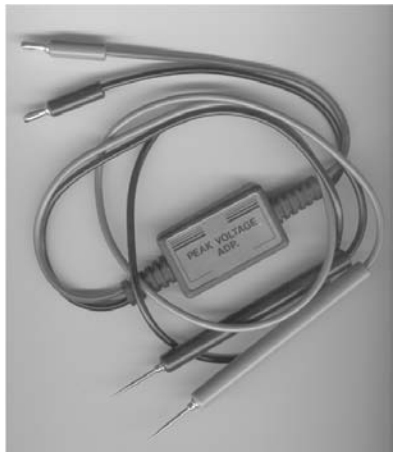
Stores code	Description	
020434Y	Oil pressure gauge connection	
020382Y011	adapter for valve removal tool	
020424Y	Punch for fitting driven pulley roller casing	
020431Y	Valve oil seal extractor	
020193Y	Oil pressure gauge	

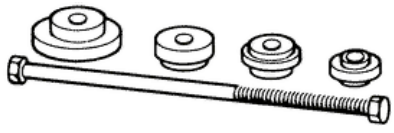
Stores code	Description	
020306Y	Punch for fitting valve sealing ring	
020360Y	52 x 55 mm adaptor	
020364Y	25 mm guide	
020375Y	Adapter 28 x 30 mm	
020376Y	Handle for adaptors	
020444Y	Driven half pulley spring compressor fit/removal tool	
020330Y	Stroboscopic light for timing control	

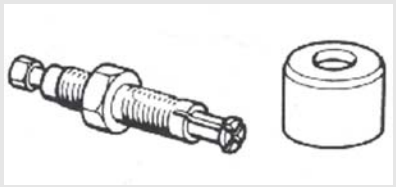
Stores code	Description	
001467Y035	Bell for bearing outside diameter 47 mm	
020368Y	driving pulley stop wrench	
020319Y	Immobilizer control test	
020287Y	Piston band clamps (Engine 125cc)	
020263Y	Driven pulley assembly sheath	

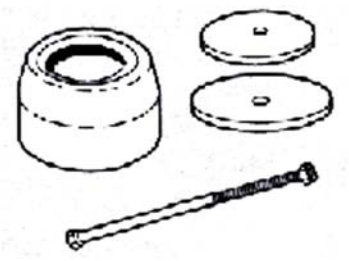
Stores code	Description	
020262Y	Crankcase splitting strip	
020430Y	Pin retainers installation tool	
020428Y	Piston position check support	
020426Y	Piston fitting fork	
020425Y	Flywheel-side oil guard punch	

Stores code	Description	
020423Y	driven pulley stop wrench	
020414Y	28-mm guide - Hub bearing assembly	
020393Y	Piston assembly band	
020382Y	Tool for removing valve cotters equipped with part 012	
020455Y	10-mm guide	

Stores code	Description	
020442Y	pulley stop wrench	
020440Y	Water pump overhaul tool	
020329Y	MITYVAC vacuum pump	
020357Y	32 x 35 mm adaptor	
020409Y	Multimeter adaptor - Peak voltage measurement	

Stores code	Description	
020456Y	diameter 24 mm adaptor	
020332Y	Digital rev counter	
020074Y	Support base for alignment control of crankshaft	
020055Y	Key for steering column ring-nut	
002465Y	Pliers for snap rings	
001330Y	Tool for fitting steering seats	

Stores code	Description	
020454Y	Tool for fitting piston pin stops (200 - 250)	
020622Y	Transmission-side oil guard punch	
020444Y011	Adapter ring	
020444Y009	Wrench 46 x 55	
001467Y	Bell	

Stores code	Description	
001467Y013	Extraction pliers for 15 mm diameter bearings	
020444Y008	adapter ring	
020244Y	15 mm diameter punch	
020115Y	Diameter 18 punch	
020271Y	Tool for removing-fitting silent bloc	

Stores code	Description	
020627Y	Flywheel stop wrench	
020467Y	Flywheel extractor	
020626Y	Drive pulley stop wrench	
020628Y	Water pump overhaul kit - quas-ar 250	

INDEX OF TOPICS

MAINTENANCE	MAIN

Maintenance chart

EVERY 3000 KM

10'

Action
Engine Oil - level check/top up

EVERY 2 YEARS

Action
coolant - change
Brake fluid - change

AT 1,000 KM OR 4 MONTHS

80'

Action
Engine oil - change
Hub oil - change
Engine oil filter - replacement
Idle speed (*) - adjustment
Throttle lever - adjustment
Steering - adjustment
Brake lever - grease
Brake pads - condition and wear check
Brake oil level - check
Safety locks - check
Electrical system and battery - check
Tyre pressure and wear - check up
Vehicle and brake test - road test

(*) See regulations in section «Idling speed adjustment»

AT 6000 KM OR 12 MONTHS

80'

Action
Hub oil level - Check
Spark plug electrode gap - check
Air filter - cleaning
Slide pads / variator rollers - check
Transmission Belt - check

Action
Coolant level - check
Brake pads - condition and wear check
Brake oil level - check
Electrical system and battery - check
Tyre pressure and wear - check up
Vehicle and brake test - road test

AT 12,000 KM OR 24 MONTHS 60,000 KM

100'

Action
Engine oil - change
Hub oil level - Check
Spark plug/electrode gap - check/replacement
Air filter - cleaning
Engine oil filter - replacement
Idle speed (*) - adjustment
Sliding block / variable speed rollers - change
Throttle lever - adjustment
Coolant level - check
Steering - adjustment
Brake lever - grease
Brake pads - condition and wear check
Brake oil level - check
Transmissions - lubricate
Safety locks - check
Suspensions - check
Electrical system and battery - check
Headlight - adjustment
Tyre pressure and wear - check up
Vehicle and brake test - road test
Transmission Belt - check

(*) See regulations in section «Idling speed adjustment»

AT 18,000 KM OR 54,000 KM

155'

Action
Hub oil level - Check
Spark plug electrode gap - check
Air filter - cleaning
Valve clearance - check
Slide pads / variator rollers - check
Coolant level - check
Radiator- external cleaning/check
Brake pads - condition and wear check
Brake oil level - check
Electrical system and battery - check
Tyre pressure and wear - check up
Vehicle and brake test - road test
Secondary air filter - cleaning
Transmission driving belt - replacement

AT 24000 KM AND AT 48000 KM

150'

Action
Engine oil - change
Hub oil - change
Spark plug/electrode gap - check/replacement
Air filter - cleaning
Engine oil filter - replacement
Idle speed (*) - adjustment
Sliding block / variable speed rollers - change
Throttle lever - adjustment
Coolant level - check
Steering - adjustment
Brake lever - grease
Brake pads - condition and wear check
Brake oil level - check
Transmissions - lubricate
Safety locks - check
Suspensions - check
Electrical system and battery - check

Action
Headlight - adjustment
Tyre pressure and wear - check up
Vehicle and brake test - road test
Transmission Belt - check

(*) See regulations in section «Idling speed adjustment»

AT 30000 KM, AT 42000 KM AND AT 66000 KM

80'

Action
Hub oil level - Check
Spark plug electrode gap - check
Air filter - cleaning
Variable speed rollers - check or replacement
Transmission Belt - check
Coolant level - check
Brake pads - condition and wear check
Brake oil level - check
Electrical system and battery - check
Tyre pressure and wear - check up
Vehicle and brake test - road test

AT 36000 KM

250'

Action
Engine oil - change
Hub oil level - Check
Spark plug/electrode gap - check/replacement
Air filter - cleaning
Engine oil filter - replacement
Idle speed (*) - adjustment
Sliding block / variable speed rollers - change
Throttle lever - adjustment
Transmission driving belt - replacement
Coolant level - check
Radiator- external cleaning/check
Steering - adjustment

Action
Brake lever - grease
Brake pads - condition and wear check
Brake pressure hose - change
Brake oil level - check
Transmissions - lubricate
Safety locks - check
Suspensions - check
Electrical system and battery - check
Headlight - adjustment
Tyre pressure and wear - check up
Vehicle and brake test - road test
Secondary air filter - cleaning
Valve clearance - check

(*) See regulations in section «Idling speed adjustment»

AT 72000 KM

270'

Action
Engine oil - change
Hub oil - change
Spark plug/electrode gap - check/replacement
Air filter - cleaning
Engine oil filter - replacement
Valve clearance - check
Idle speed (*) - adjustment
Sliding block / variable speed rollers - change
Throttle lever - adjustment
Transmission driving belt - replacement
Coolant level - check
Radiator- external cleaning/check
Steering - adjustment
Brake lever - grease
Brake pads - condition and wear check
Brake pressure hose - change
Brake oil level - check

Action
Transmissions - lubricate
Safety locks - check
Suspensions - check
Electrical system and battery - check
Headlight - adjustment
Tyre pressure and wear - check up
Secondary air filter - cleaning
Vehicle and brake test - road test

(*) See regulations in section «Idling speed adjustment»

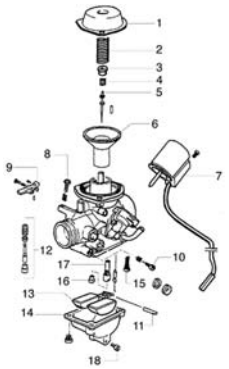
Carburettor

Carburettor

- Disassemble all carburettor components, accurately wash them in solvent, then dry them with compressed air. To ensure thorough cleaning, pay special attention to the passages in the carburettor body.
- Carefully check the condition of all components.
- The throttle must slide freely in the chamber, if the play is excessive because or wear, replace the throttle.
- Replace the carburettor if the chamber shows signs of wear as to prejudice the valve's regular seal or free sliding (though it is new).
- When reassembling the carburettor, it is a good rule to replace the gaskets.

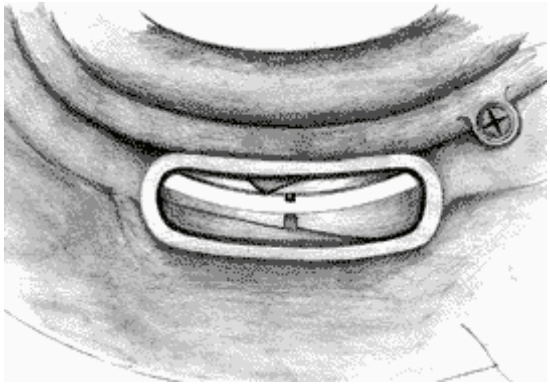
WARNING

PETROL IS HIGHLY EXPLOSIVE. ALWAYS FIT NEW SEALS AND GASKETS TO PREVENT LEAKAGE.

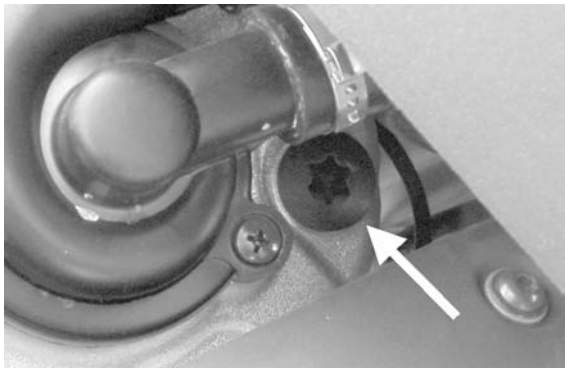


1. Diaphragm cover - **2**. Throttle valve spring - **3**. Conical needle support - **4**. Conical needle spring - **5**. Conical needle - **6**. Throttle valve diaphragm - **7**. Automatic starting device - **8**. Idle speed adjusting screw - **9**. Accelerating pump rocker - **10**. Idle mixture adjusting screw - **11**. Float pin - **12**. Accelerating pump assembly - **13**. Float - **14**. Float chamber - **15**. Idling jet - **16**. Main jet - **17**. Diffuser - **18**. Float chamber drain screw.

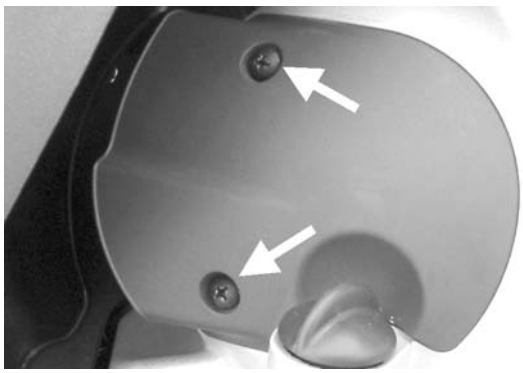
Checking the spark advance



- To check the ignition advance, use the stroboscopic lamp with induction collet connected to the spark plug power supply cable.
- Connect the induction collet according to the right polarity (the arrow on the collet must be facing the spark plug).
- Set the lamp selector to the central position (1 spark = 1 driving shaft revolution as in 2 stroke engines).
- Start the engine and check that the lamp is in good working order and that the rpm counter reads high speeds too (e.g. 8,000 rpm).
- If you detect abnormal flashes or rpm reads, increase the resistive load on the spark plug supply line (10 ÷ 15 KΩ in series with the H.V. cable).



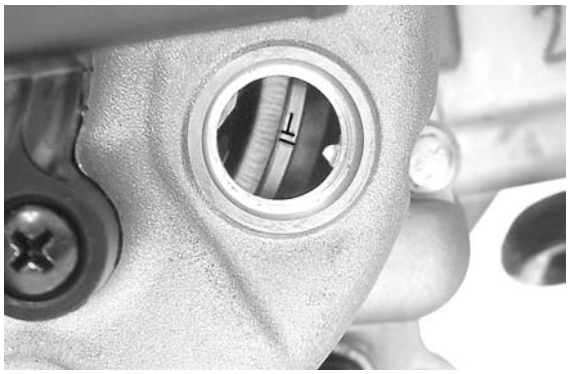
- Remove the spark plug.
- Remove the plastic cover from the slotted hole on the flywheel cover, indicated in the picture.



- Remove the transmission compartment air intake cover shown in the photograph.

- Using a screwdriver rotate the fan, mounted onto the drive pulley, until the marking on the fly-

wheel is aligned with that stamped on the fly-wheel cover, as shown in the picture.



- Mark the alignment between fan and transmission cover on the transmission side, as shown in the picture.
- Refit the spark plug.
- Refit the plastic cover on the flywheel cover.

Characteristic

Spark advance check

from 10°± 1° to 2000 rpm

through 28°±1° to 6500 rpm

- Check that the advance degrees match the revolution speed as indicated in the tables.
- In case of abnormal values, check the Pick-Up and the control unit supplies (positive-negative); replace the control unit, if required.
- A new control unit prevents the engine from rotating at over 2,000 rpm.
- The programmed control unit allows the engine revolution within the prescribed limits.

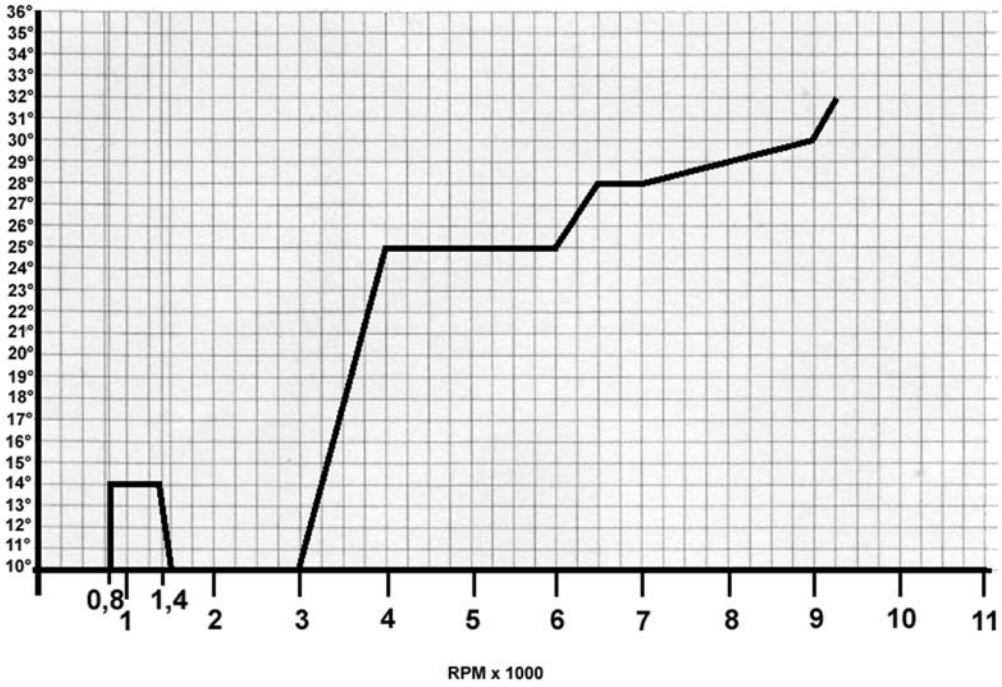
Specific tooling

020330Y Stroboscopic light for timing control

Spark advance variation

SPARK ADVANCE VARIATION

Specification	Desc./Quantity
Tripping threshold	First threshold : 9600 ±50 Second threshold : 9800 ±50
Restoration threshold	First threshold : 9500 ±50 Second threshold : 9700 ±50
Spark suppression	First threshold : 1 spark out of 7 Second threshold: 2 sparks out of 3

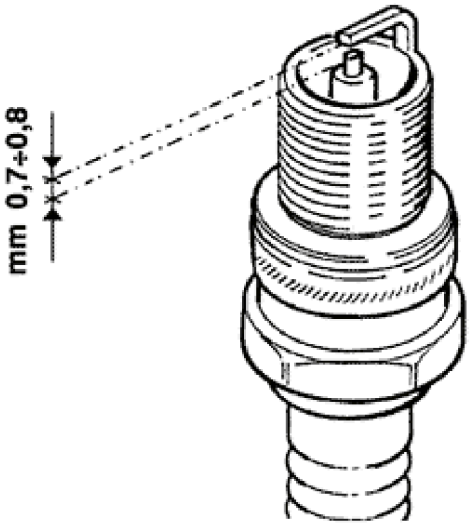


Spark plug

- Put the vehicle on the central stand.
- Open the door on the left side of the vehicle by levering in the recess in the lower part of the door after removing the screw.
- Disconnect the spark plug HV cable cap. - Unscrew the spark plug with the spanner provided.
- Check the spark plug to see if the insulator is cracked, the electrodes are worn out or excessively sooty. Also check the condition of the seal washer and measure the spark gap with a suitable thickness gauge.
- If necessary adjust the spark gap by carefully bending the side electrode. If the spark plug has any of the defects mentioned above, replace it with a plug of the recommended type.
- Insert the plug into the hole with the proper in-

clination, screw it in fully by hand and then tighten it with the specially designed spanner.

- Push the spark plug cap all the way down onto the spark plug and then proceed to the reassembly.



CAUTION

THE SPARK PLUG MUST BE REMOVED WITH COLD ENGINE. THE SPARK PLUG SHOULD BE REPLACED EVERY 12,000 KM. THE USE OF NON-CONFORMING IGNITION CONTROLLERS, AND SPARK PLUGS OTHER THAN THOSE PRESCRIBED CAN SERIOUSLY DAMAGE THE ENGINE.

Characteristic

Recommended spark - plug 1

Champion RG 4 HC

Spark plug: electrode distance

0.7 mm ÷ 0.8 mm

Locking torques (N*m)

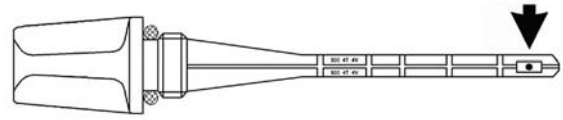
Spark plug 12 - 14

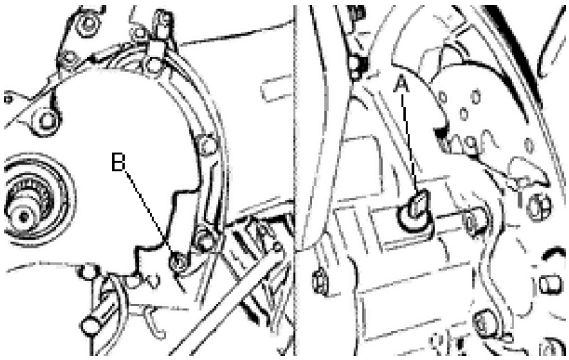
Hub oil

Check

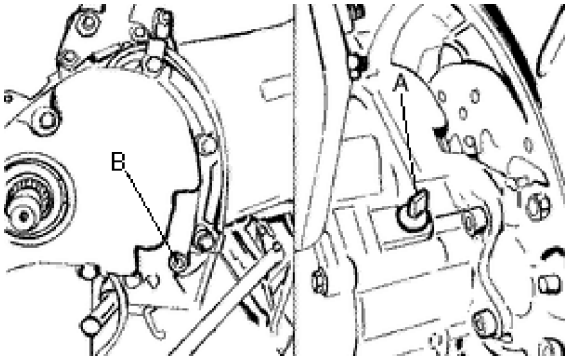
- Put the vehicle on the central stand on level ground.
- Unscrew oil dipstick "**A**", wipe it with a clean cloth, reinsert it and **then screw it in fully**.
- Pull out the dipstick and check that the oil reaches the lower notch (see figure). If the oil level is below the MAX mark, pour fresh oil into the hub until the correct level is restored.
- Reinsert the dipstick and screw it tight.

The notches on the hub oil dipstick, with the exception of the MAX mark, are meant for other models and fulfil no specific function on this vehicle.





Replacement



- Remove oil filler plug "**A**".
- Unscrew oil drain plug "**B**" and drain all the oil.
- Retighten the oil drain plug and then fill the hub with fresh oil.

Recommended products

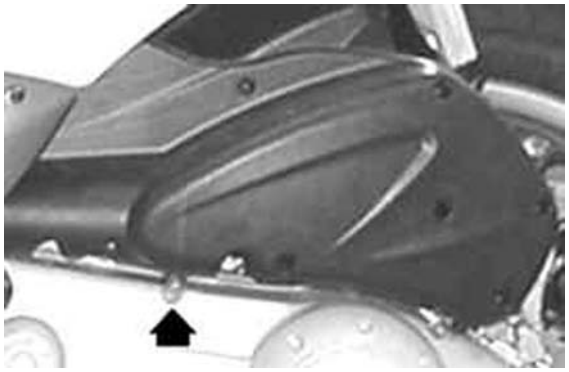
TUTELA ZC 90 Rear hub oil

SAE 80W/90 Oil that meets API GL3 specifications

Locking torques (N*m)

Hub oil drainage screw 15 - 17 Nm

Air filter



- Remove the left footboard and the left side panel as described in Chapter Bodywork.
- Remove the cleaner cap after loosening the 9 fixing screws.
- Pull out the filter element.
- Replace the air filter with a new one.

N.B.

CHECK AND IF NECESSARY BLOW THE AIR FILTER EVERY 6,000 KM. DIRECT THE AIR JET FROM THE INSIDE TO THE OUTSIDE OF THE FILTER (I.E. IN THE OPPOSITE DIRECTION TO THE AIR FLOW DURING NORMAL ENGINE OPERATION). EVERY 6,000 KM, DURING THE SCHEDULED SERVICE, REMOVE THE RETAINER, TAKE OFF THE RUBBER CAP FROM UNDER THE FILTER BOX AS SHOWN IN THE FIGURE AND DRAIN ANY OIL RESIDUES.

Cleaning (Every 12,000 km):

- Wash with water and shampoo.
- Dry with light jets of compressed air and wipe with a clean cloth.
- Soak with a 50% fuel-oil mixture.
- Let the filter cartridge drip and then squeeze it between the hands without wringing.

- Refit the filter element.

CAUTION

DO NOT RUN THE ENGINE IF THE AIR FILTER IS NOT IN PLACE AS THIS WOULD RESULT IN EXCESSIVE WEAR OF THE CYLINDER AND PISTON AS WELL AS IN DAMAGE TO THE CARBURETTOR.

CAUTION

IF THE SCOOTER HAS BEEN DRIVEN ON DUSTY ROADS, THE AIR FILTER MUST BE CLEANED MORE FREQUENTLY THAN WHAT INDICATED IN THE SCHEDULED MAINTENANCE TABLE.

Recommended products

Selenia Air Filter Oil Oil for air filter sponge

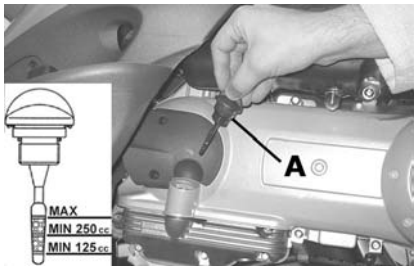
Mineral oil with special additives to increase the ISO VG 150 adhesiveness

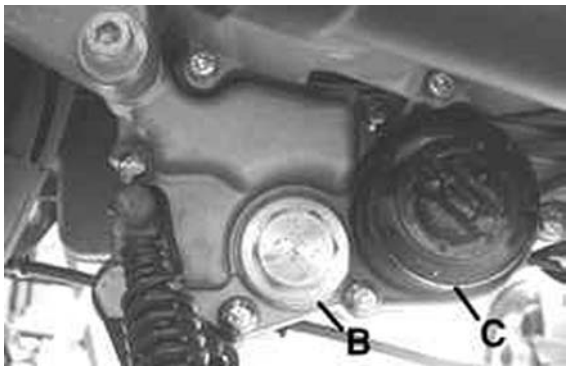
See also

Footrest

Engine oil

Replacement





The engine oil should be replaced after the first 1,000 km, and then every 12,000 km. The engine must be drained through the net filter draining cap «**B**» on flywheel side; in addition, to facilitate the drainage, oil dipstick «**A**» should be loosen. Once the engine oil has been drained, remove oil cartridge «**C**».

Since a certain oil quantity remains inside the circuit, the fill-up must be carried out with 600-650cc of fresh oil poured through filler cap «**A**». Hence start the vehicle, let the engine run for a few minutes, and then shut it back down; after approx. five minutes, check the level and top-up if necessary, without exceeding the **MAX** mark.

N.B.

THE ENGINE MUST BE HOT WHEN THE OIL IS CHANGED.

Recommended products

SELENIA HI Scooter 4 Tech Engine oil

Synthetic oil SAE 5W-40 that exceeds the API SJ specifications.

Locking torques (N*m)

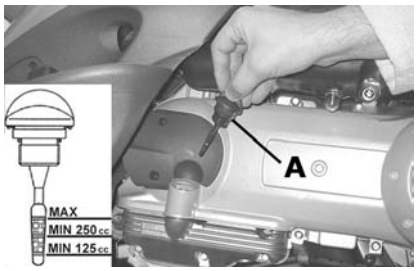
Engine oil drain plug 24 - 30

See also

Engine oil filter

Check

In four-stroke engines oil is used to lubricate the valve gear components, the crankshaft bearings and the power plant. **A lack of engine oil can cause serious damage to the engine**. In all four-stroke engines, oil deterioration and consumption are, to some extent, normal, especially during running-in. Consumption partly depends on the riding style (for example, constantly riding at full throttle increases oil consumption).



Perform this operation when the engine cold, as described below:

1) Put the vehicle on its central stand on a flat surface.

2) Unscrew dipstick "**A**", dry it with a clean cloth and refit by **screwing it completely.**

3) Remove the dipstick again and check that the oil level is between the MAX and MIN marks on the dipstick; top up if necessary.

The MAX level mark indicates an amount of about 1100 cc of engine oil. The level will be lower if checked after using the vehicle (i.e. when the engine is hot). To obtain a correct indication of the oil level, wait for at least 10 minutes after switching off the engine.

Characteristic

Engine oil

~ 1200 cc

If the oil level is too low, top up by adding fresh oil without **exceeding the MAX level.**

Approximately 400 cc of oil are needed to restore the level between the **MIN** and **MAX** marks.

Engine oil filter

The cartridge filter must be replaced every time the oil is changed. Use new oil of the recommended type for topping up and changing purposes.

Make sure the pre-filter and discharge tap O-rings are in good condition. Lubricate them and refit the gauze filter and oil drainage tap, screwing them up to the prescribed torque. Refit the new cartridge filter being careful to lubricate the O-ring before the fitting. Change the engine oil.

Recommended products

SELENIA HI Scooter 4 Tech Engine oil

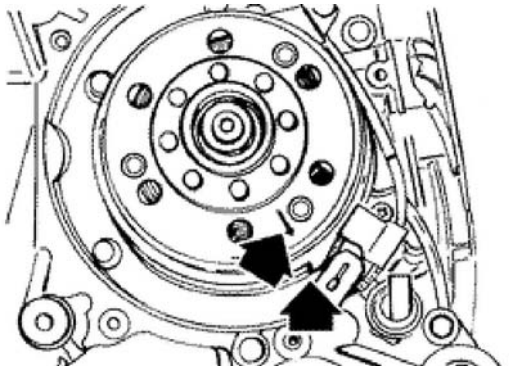
Synthetic oil SAE 5W-40 that exceeds the API SJ specifications.

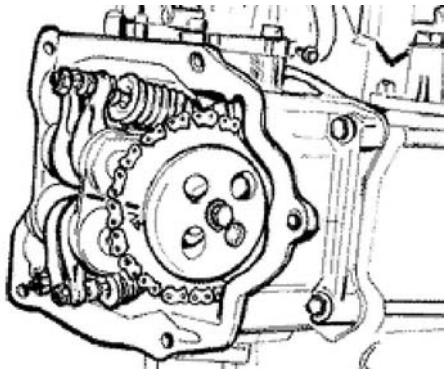
Oil pressure warning light

Oil pressure warning light. A warning light on the instrument panel comes on when the ignition key is turned to the "**ON**" position. The light must go out after the engine has started.

Should the warning light come on while braking, idling or cornering, check the oil level and the lubrication system as soon as possible.

Checking the ignition timing





- Remove the four fixing screws and detach the flywheel cover, with the water pump and hoses, from the engine.
- Turn the flywheel until the reference mark reaches the fine machining on the crankcase, as shown in the picture (TDC). Ensure the 4V mark, stamped on the camshaft drive pulley, is aligned with the reference mark on the head, as shown in the second figure. If the mark is on the opposite side of the sign stamped on the head, crank the engine so that the crankshaft computes a complete revolution.
- The TDC reference mark is also shown on the flywheel cooling fan and cover.

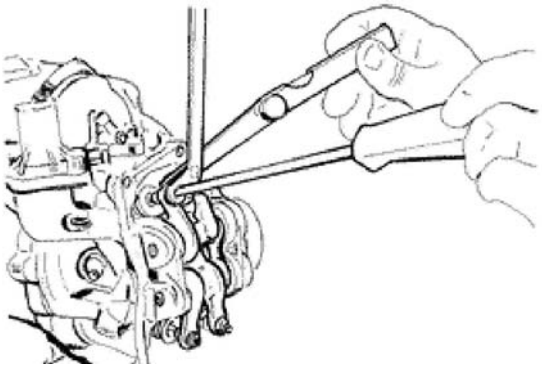
In order to use these markings, remove the spark plug and crank the crankshaft backwards, using a

retaining tool to hold the camshaft driving pulley.

N.B.

IF THE TIMING ASSEMBLY IS NOT IN PHASE, ADJUST IT AS REQUIRED.

Checking the valve clearance



-To check the valve clearance, you have to make the point references coincide

-Check that the clearance between the valve and register corresponds to the values shown using a proper thickness gauge. If the values of the valve clearances - intake and discharge, respectively - are different than those given below, adjust them by loosening the lock nut and using a screwdriver on the register as shown in the figure.

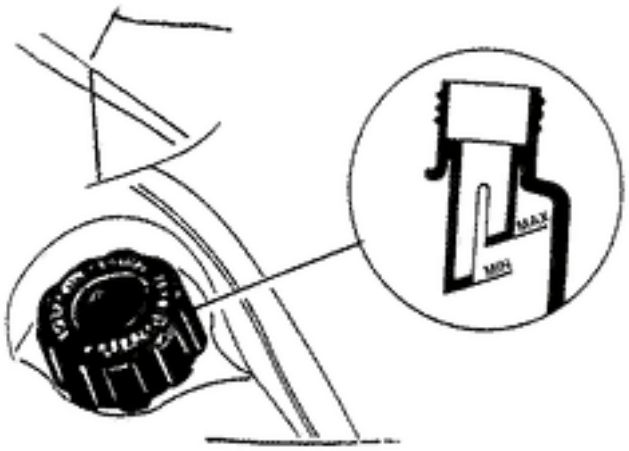
Air intake: 0.10 mm (cold)

Discharge: 0.15 mm (cold)

Cooling system

Level check

- To check the level, it is necessary to look inside the expansion tank: a mark on the side of the filler indicates MIN and MAX levels.



Top-up

The coolant level must checked every 6,000 kilometres with a cold engine, in the way shown below:
Place the scooter on its centre stand and on flat ground.
- Undo the screw shown in the figure and remove the expansion tank cap on RHS.
- Remove the cap of the expansion tank and top up the fluid level if it is near or below the MIN mark inside the tank. The coolant level must always be between MIN and MAX. level.
-The coolant consists of an ethylene glycol and corrosion inhibitor based 50% demineralised water-antifreeze solution mix.

CAUTION

TO PREVENT THE COOLANT FROM LEAKING OUT OF THE EXPANSION TANK DURING USE, BE SURE TO NEVER EXCEED THE MAX. LEVEL WHEN REFILLING

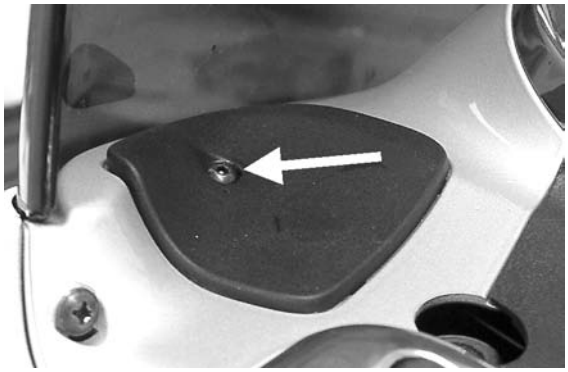
Braking system

Level check

The brake fluid tanks for the front and rear brakes are located on the pumps under the handlebar cover. Proceed as follows:
- Bring the scooter onto the centre stand and with the handlebar centred; - check the fluid level at the sight glass as shown in the figure.
A certain lowering of the level is caused by wear of the brake pads.

Top-up

- Remove the cap on the handlebar cover as shown in the photograph.



- Remove the tank cap by loosening the two screws, remove the gasket and top up using only the liquid specified without exceeding the maximum level.

CAUTION

USE ONLY DOT 4 BRAKE FLUID.

CAUTION

KEEP THE BRAKE FLUID AWAY FROM THE SKIN, THE EYES AND CLOTHING. IN CASE OF CONTACT, RINSE GENEROUSLY WITH WATER.

CAUTION

BRAKE CIRCUIT FLUID IS VERY CORROSIVE; MAKE SURE THAT IT DOES NOT COME INTO CONTACT WITH THE PAINTWORK.

CAUTION

THE BRAKE CIRCUIT FLUID IS HYGROSCOPIC, IN OTHER WORDS, IT ABSORBS MOISTURE FROM THE SURROUNDING AIR. IF THE CONTENT OF MOISTURE IN THE BRAKING FLUID EXCEEDS A CERTAIN VALUE, BRAKING WILL BE INEFFICIENT.
NEVER USE BRAKE LIQUID IN OPEN OR PARTIALLY USED CONTAINERS.
UNDER NORMAL CLIMATIC CONDITIONS, THE FLUID MUST BE CHANGED EVERY 20,000 KM OR ANYWAY EVERY TWO YEARS.

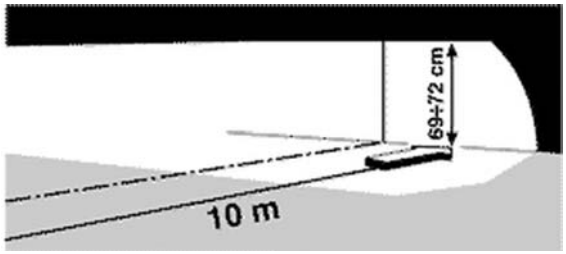
Recommended products

TUTELA TOP 4 Brake fluid

SAE J1703, NHTSA 116 DOT 4, ISO 4925 synthetic fluid

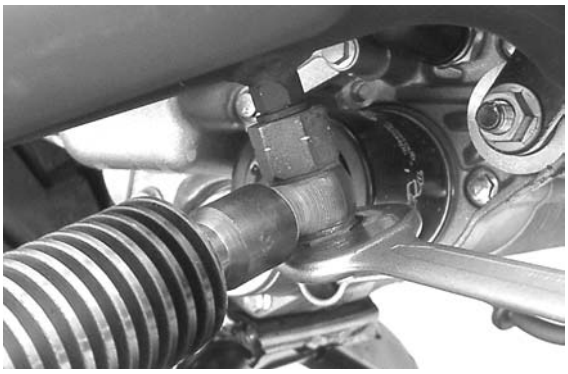
Headlight adjustment

- Place the unloaded vehicle on a level surface, 10 metres from a half-lit white screen, with the tyres inflated to the prescribed pressure. Ensure that the axis of the vehicle is perpendicular to the screen.
- Draw a horizontal line on the screen 69 ÷ 72 cm above the ground.
- Switch on the headlight, turn on the low beam and check that the horizontal line that divides the dark area from the lighted area is not above the line previously drawn on the screen. To shift the headlight, turn the adjusting screw in the glove compartment (see figure).



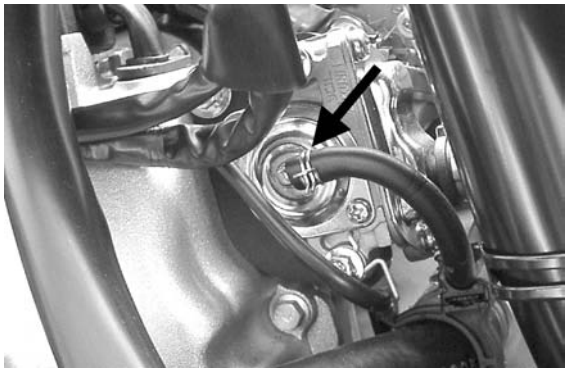
CO check

- Remove RHS footrest.
- Remove the gas cap on the exhaust pipe.
- Using the original washer, install the exhaust gas collection kit as shown in the picture.

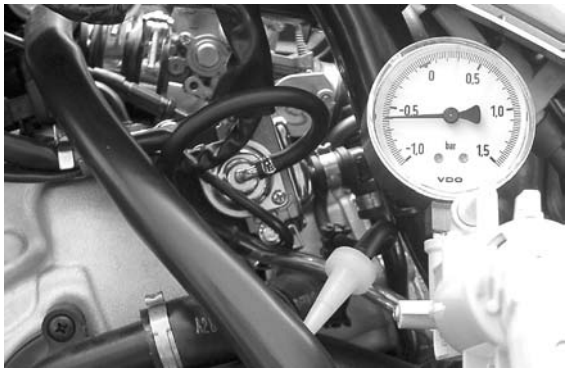


- Suitably orientate all the components.
- Shut the gas outlet terminal of the tool.
- Start the engine and let it warm up until the electric fan activates.
- Stop the engine.

- Disconnect the SAS check valve vacuum hose shown in the figure.
- Seal the connection using a conical a cap.



- Connect the Mitivac vacuum pump to the SAS control valve.
- Start the vacuum pump up to a pressure of -0.6 ÷ -0.8 bar so to close the valve and cut off the SAS system.
- Remove the exhaust gas collection kit cap and connect the analyzer adequately pre-heated.
- Check the analyser output and the engine rpm.
- Adjust the CO concentration.



N.B.

CHECK THAT THE RESULT IS OBTAINED WITH THE GAS VALVE IN THE CLOSEST POSITION.

N.B.

ALSO CHECK THAT THE CARBURETION ADJUSTMENT IS OBTAINED WITH THE FLOW SCREW OPEN BY 2 TO 4 TURNS.

N.B.

IF NOT, CHECK THE FUEL LEVEL ADJUSTMENT IN THE BASIN AND CHECK THE FUEL CIRCUIT.

N.B.

IN CASE OF UNSTEADY CO, CHECK THE CARBURETTOR CLEANING, THE FEEDING SYSTEM EFFICIENCY AND THE VACUUM SEALS.

N.B.

IN CASE OF UNBURNT HYDROCARBONS (HC) > OF 1,000 P.P.M., CHECK THE IGNITION SYSTEM, THE TIMING, THE VALVE CLEARANCE AND THE DRAINAGE VALVE SEAL.

Specific tooling

020329Y MITYVAC vacuum pump

020332Y Digital rev counter

494929Y Exhaust gas analyser

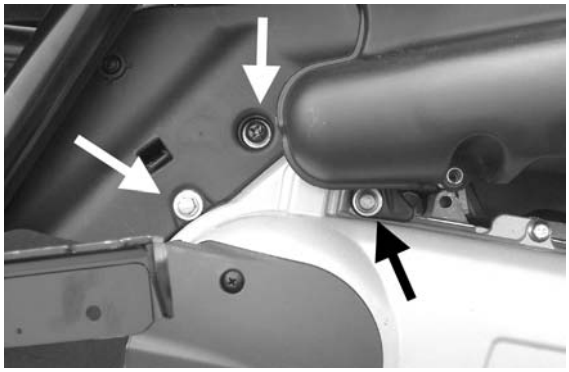
Characteristic

Verification

3,8±0,7 to 1650±50 rpm

SAS filters inspection and cleaning

- Remove LHS footrest.
- Remove the air-box/crankcase fixing screws.
- Remove the three fixings shown in the figure.



- Detach the oil vapours recovery line and the choke cable harness from the clamp shown in the picture.
- Remove the plastic fairing.

- Remove the two screws shown in the picture.

- Remove the two screws shown in the picture.
- Remove the filter shown in the picture.
- Inspect the gasket.
- Ensure the SAS filter box is not cracked or deformed.
- Accurately clean the SAS filter. In the event of

break-ups or abnormal deformations, proceed with the replacement.

For the reassembly, follow the above operations in the reverse order.

CAUTION

IF THE SCOOTER HAS BEEN DRIVEN ON DUSTY ROADS, THE AIR FILTER MUST BE CLEANED MORE FREQUENTLY THAN WHAT INDICATED IN THE SCHEDULED MAINTENANCE TABLE.

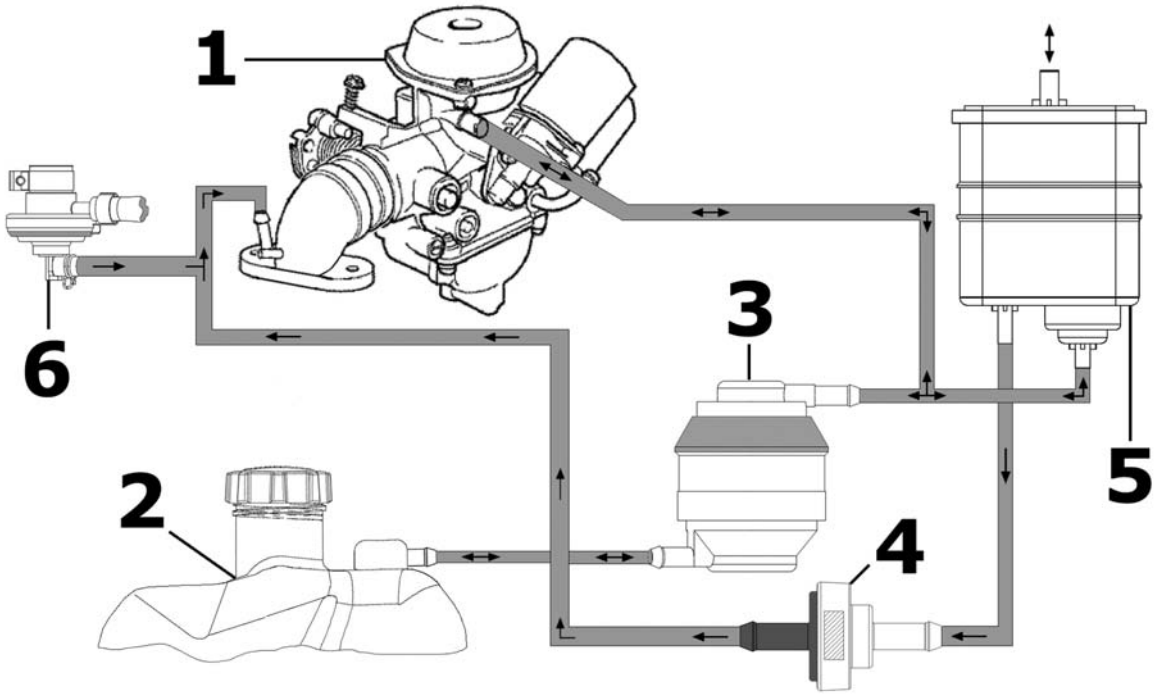
CAUTION

NEVER LET THE ENGINE RUN WITHOUT THE SECONDARY AIR FILTER.

See also

Footrest

Anti-evaporation system



ANTI-EVAPORATION SYSTEM

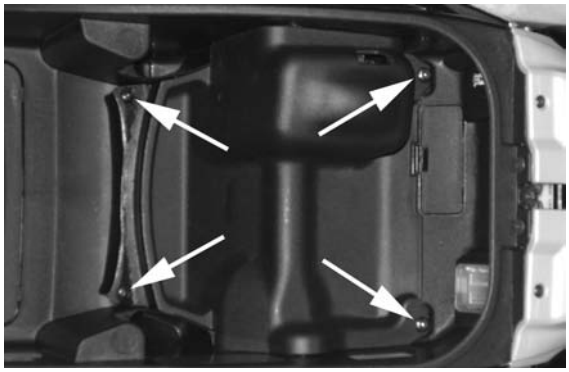
Specification	Desc./Quantity
1. Carburettor	
2. Fuel tank	
3. Roll-over valve	
4. Safety valve	

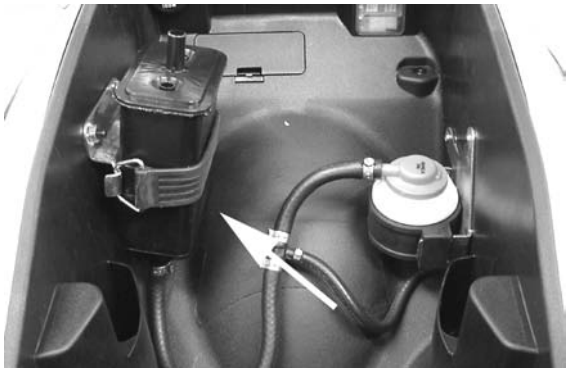
Specification	Desc./Quantity
5. Canister	
6. Vacuum fuel tap	

Removing system components

- Canister Removal

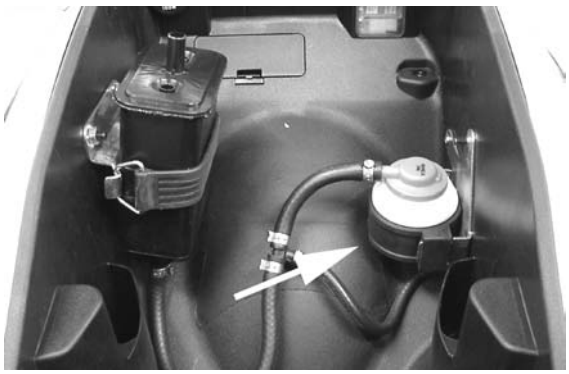
Gain access to the canister by removing the cover located inside the helmet compartment. Release the retaining belt and metallic clamps, then remove the hoses.





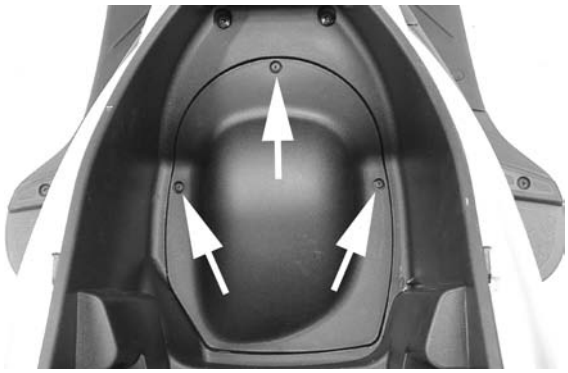
• Roll-over valve removal

Reach for the valve by removing the cover located inside the helmet compartment. Detach the retaining latch, and remove the metal clamps and hoses.



• Roll-over and/or Safety Valve Removal

Remove the cover, release the metallic clamps, and then remove the hoses. The two valves are not supported.



Refitting system components

- Replace the components inserting the piping properly and fastening them with new metal strips.
- Be careful to the direction of installation of the components. The safety valve and the Roll-over valve, if fitted in the reverse direction, affect the operation of the entire anti-evaporation system.

Canister inspection

The Canister is fundamental for treating the hydrocarbons contained inside the volume of gas departing the fuel tank when the internal pressure rises (due to the heat induced by the radiator, engine or ambient temperature).

The volume of air is limited by the operation of ventilation valve (Roll-over).

Even though the quantity of hydrocarbons coming from the tank is fairly small, active carbon should be regenerated by a reversed flow of the ambient air sucked in by the engine, to prevent the satura-

tion of the canister.

This carbon pollution and regeneration phenomena occur during each cycle of utilization of the vehicle.

To check the Canister, it is necessary to proceed with its removal, whilst keeping the two hoses attached.

• Shake the Canister and ensure it emits no noise.

• Using a compressed air gun, blow the 3 ducts and ensure this does not result in a pressure build-up inside the Canister.

• Ensure the airflow is undisturbed and no carbon residues exit the hose.

Replace the Canister if noisy, clogged up, or leaking carbon residues.

Safety valve check

The Canister is cleaned by an air flow controlled by the vacuum inlet located on the intake manifold.

To guarantee the correct operation of the engine, the mass air flow must not be excessively large; this is obtained by using a narrow section (0.9mm) for the inlet on the intake manifold.

The Canister tubing connections comprise the installation of a safety valve.

This is a unidirectional valve that ensures the air flow towards the manifold when the control vacuum is over 200mbar.

The engine vacuum at idle causes a weak air flow that can be easily compensated for with the idle adjustment parameters.

When the vehicle is stationary, the safety valve will be shut due to the lack of control vacuum; for this reason, any expansion of the fuel tank will not pollute the intake manifold thus preventing engine floods.

The valve should preferably be removed from the vehicle upon inspection; alternatively, it will be sufficient to access the tubing on the manifold side.

• Connect the MITYVAC pump on the engine side duct.

• Set the pump control onto "vacuum", then slowly apply vacuum to check the valve opening threshold.
If different pressures are found, replace the valve.
N.B. If the opening vacuum is too high, it causes a lack of active carbon regeneration; on the other hand, if it is too low, it increases the air flow rate to the engine, thus causing a poor fuel-oxygen mixture at idle.

Characteristic

Standard opening vacuum

200 ÷ 260 mbar

Roll-over valve check

The valve should allow the following results:
• Tank aeration when running (ambient air enters into the tank based on the volume of fuel used).
• Tank pressurization (the tank internal temperature may rise when running or while stopped. The valve should pressurize the tank so to limit the amount of fuel vapors departing towards the Canister).
Prevent the liquid fuel pollution of the Canister (if the vehicle falls, the valve should interrupt the connection to the Canister).

The valve must be removed from the vehicle upon inspection.
A MITYVAC pump and a length of pipe are needed for the inspection; proceed as follows:
• Attach the MITYVAC pump to the lower joint to the safety valve (white).
• Set the pump control onto "vacuum" and, whilst keeping the valve aligned with its **vertical axis**, check that air may be sucked in without observing any movements on the manometer needle gauge.
• Set the pump onto "pressure" and, whilst keeping the valve aligned with its **vertical axis**, check that the valve can be pressurized to values

slightly below 0.1bar (~60mbar).

N.B. The calibration pressure can be easily recognized as, when reached, the valve will start to discharge air thus emitting a weak noise.

• Align the valve with its **horizontal axis** and check that it can be pressurized to values much higher than the calibration pressure (e.g. 0.5bar without it necessarily being maintained).

Replace the valve if anomalies are found.

N.B. Any valve failure may cause the fuel tank to deform or increase of the Canister operating requirements.

INDEX OF TOPICS

TROUBLESHOOTING	TROUBL

Engine

Poor performance

POOR PERFORMANCE

Possible Cause	Operation
Dirty carburettor; feeding pump or vacuum cock failure	Remove, wash with solvent, dry with compressed air or replace
Excessive scaling in the explosion chamber	Remove the scale from cylinder, piston, head and valves
Wrong timing or worn timing components	Restore the timing or replace worn parts
Clogged silencer	Replace
Air filter clogged or dirty	Remove the sponge, wash with water and shampoo, then impregnate it in a 50% mixture of fuel and specific oil (Selenia Air Filter Oil), then press it without squeezing, let it drip and replace it
Automatic starter failure	Check: mechanical sliding, electric connection and presence of power supply, replace if required
Engine oil level exceeding the maximum	Check the causes and restore the correct level
Low compression: wear of linings, cylinder and valve	Replace worn parts
Transmission belt worn	Replace
Inefficient automatic transmission	Check the pulley sliding and rollers, replace faulty components, lubricate the mobile driven pulley guide with grease Montblanc Molybdenum Grease
Clutch slipping	Check and replace the clutch unit and/or the bell, if required
Overheated valves	Remove the head and the valves, grind or replace the valves
Incorrect valve adjustment	Adjust the valve clearance
Valve seat deformed	Replace the head unit
Dirty air filter	Remove the sponge, wash with water and shampoo, then impregnate it in a 50% mixture of fuel and specific oil (Selenia Air Filter Oil), then press it without squeezing, let it drip and replace it.
Defective float valve	Check the proper sliding of the float and the valve efficiency

Rear wheel spins at idle

REAR WHEEL TURNING WITH IDLE ENGINE

Possible Cause	Operation
Idle rpm too high	Adjust the engine idle speed and the CO, if required.
Clutch failure	Check clutch springs / masses

Starting difficulties

START-UP DIFFICULTIES

Possible Cause	Operation
Altered fuel characteristics	Drain altered fuel and refuel
Start up speed too low or starter system and motor failure	Check the starter motor, the system and the torque limiter
Incorrect valve seal or wrong valve adjustment	Inspect the head and/or set the correct clearance
Flooded engine	Start up keeping the gas fully open. If the engine won't start, remove the spark plug, dry it and before replacing it, start the engine to eject the excess of fuel, keeping the cap connected to the spark plug and the latter to earth. If fuel has finished, refuel and start up
Automatic starter failure	Check: mechanical sliding, electric connection and presence of power supply, replace if required
Air filter clogged or dirty	Remove the sponge, wash with water and shampoo, then impregnate it in a 50% mixture of fuel and specific oil (Selenia Air Filter Oil), then press it without squeezing, let it drip and replace it
Faulty spark plug or incorrect ignition advance	Replace the spark plug or check the ignition circuit components
Dirty carburettor; feeding pump or vacuum cock failure	Remove, wash with solvent, dry with compressed air or replace
Flat battery	Check the battery charge level, in case of traces of sulphation, replace and start the new battery as instructed in section 4-13
Cracked intake union or strips not tightened properly	Replace the intake union and check the strip tightening
Defective float valve	Check the proper sliding of the float and the valve efficiency
Carburettor nozzles clogged	Remove, wash with solvent, dry with compressed air

Excessive oil consumption/Exhaust smoke

EXCESSIVE OIL CONSUMPTION / SMOKE UPON EXHAUST

Possible Cause	Operation
Worn valve guides	Check and replace the head unit if required
Worn valve oil guard	Replace the valve oil guard
Oil leaks from the couplings or from the gaskets	Check and replace the gaskets or restore the coupling seal
Worn or broken piston rings, or mounted incorrectly	Replace the piston rings or the cylinder unit

Insufficient lubrication pressure

POOR LUBRICATION PRESSURE

Possible Cause	Operation
By-Pass remains open	Check the By-Pass and replace if required. Carefully clean the By-Pass area.
Oil pump with excessive clearance	Perform the dimensional checks on the oil pump components
Oil filter too dirty	Replace the cartridge filter
Oil level too low	Restore the level using the recommended oil type (Selenia HI Scooter 4 Tech)

Engine tends to cut-off at full throttle

THE ENGINE TENDS TO STOP AT MAX GAS OPENING

Possible Cause	Operation
Defective feeding circuit	Check the feeding pump, the vacuum inlet, and the duct seal, replace if required
Incorrect float level	Restore the level in the basin by bending the fuel inlet pin thrusting reed on the float so as to have the float parallel to the basin plane with upturned carburettor
Water in the carburettor	Empty the tank through the appropriate bleed nipple.
Maximum nozzle dirty- carburation lean	Wash the nozzle with solvent and dry with compressed air

Engine tends to cut-off at idle

THE ENGINE TENDS TO STOP AT IDLE

Possible Cause	Operation
Wrong timing	Adjust the timing and check the timing components

Possible Cause	Operation
Cut-off device failure	Check the efficiency of the valve, membrane, spring, and the cleaning of the sponge filter
Idle adjustment is incorrect	Adjust with the rpm counter
Compression end pressure too low	Check the seals of the thermal unit and replace worn components
Faulty spark plug or incorrect ignition advance	Replace the spark plug or check the ignition circuit components
Starter remains pressed	Check: electric connections, circuit continuity, mechanical sliding, and presence of power; replace, if required
Minimum nozzle dirty	Wash the nozzle with solvent and dry with compressed air

High fuel consumption

HIGH CONSUMPTION

Possible Cause	Operation
Float level	Restore the level in the basin by bending the fuel inlet pin thrusting reed on the float so as to have the float parallel to the basin plane with upturned carburettor
Slackened nozzles	Check the maximum and minimum nozzle locking into their seat
Fuel pump failure	Check that there is no fuel in the vacuum duct
Starter inefficient	Check: electrical wiring, circuit continuity, mechanical sliding and power supply
Air filter clogged or dirty	Remove the sponge, wash with water and shampoo, then impregnate it in a 50% mixture of fuel and specific oil (Selenia Air Filter Oil), then press it without squeezing, let it drip and replace it

Excessive exhaust noise

EXCESSIVE NOISE WITH EXHAUST

Possible Cause	Operation
Cut-off valve of the secondary air device does not work	Replace the secondary air device
Pressure inlet pipe from the secondary air device disconnected or cracked	Replace the pipe
Reed valve of the secondary air device does not close properly and deteriorates the rubber coup-	Replace the device and coupling

Possible Cause	Operation
ling between the device and the head pipe	

SAS malfunctions

SECONDARY AIR DEVICE ANOMALIES

Possible Cause	Operation
Cutoff valve of the secondary air device not working	Replace the secondary air device
Vacuum inlet pipe from the secondary air device disconnected or cracked	Replace the pipe
Reed valve of the secondary air device does not close properly and deteriorates the rubber sleeve between device and head pipe	Replace device and sleeve.

Transmission and brakes

Clutch grabbing or performing inadequately

IRREGULAR CLUTCH PERFORMANCE OR SLIPPAGE

Possible Cause	Operation
Faulty clutch	Check that there is no grease on the masses. Check that the clutch mass contact surface with the casing is mainly in the centre with equivalent characteristics on the three masses. Check that the clutch casing is not scored or worn in an anomalous way

Insufficient braking

INSUFFICIENT BRAKING

Possible Cause	Operation
Inefficient braking system	Check the pad wear (1.5 min). Check that the brake discs are not worn, scored or warped. Check the correct level of fluid in the pumps and replace brake fluid if necessary. Check there is no air in the circuits; if necessary, bleed the air. Check that the front brake calliper moves in axis with the disc.
Fluid leakage in hydraulic braking system	Elastic fittings, piston seals or brake pump breakdown, replace

Brakes overheating

BRAKE OVERHEATING

Possible Cause	Operation
Rubber gaskets expanded or sealed	Replace the gaskets
Pump compensation holes clogged	Clean carefully and blow with compressed air
Brake disc slack or distorted	Check locking of the brake disc screws; use a dial gauge and a wheel mounted on the vehicle to measure the axial shift of the disc.
Defective piston sliding	Check calliper and replace any damaged part.

Braking vibrations or noise

VIBRATIONS OR REFRAINED NOISINESS

Possible Cause	Operation
Brake disc slackened or deformed	Check the tightening of the brake disc screws; measure the disc axial deviation using a comparator and keeping the wheel mounted on the vehicle

Electrical system

Battery

BATTERY

Possible Cause	Operation
Battery	This is the system device that requires the most assiduous surveillance and the most diligent maintenance. If the vehicle is not used for a certain period (1 month and more), the battery needs periodical recharging. The battery tends to go completely flat within around 3 months. When reinstalling the battery on the motor cycle, be careful not to invert connections, considering that the black earth wire must be connected to the negative terminal, whereas the other red wire must be connected to the terminal marked with + sign.

Turn signal lights malfunction

FLASHING LIGHTS NOT WORKING

Possible Cause	Operation
Electronic ignition device failure.	With the key switch set to «**ON**» connect the

Possible Cause	Operation
	jumpers 1 (Blue-Black) and 5 (Red/Blue) on the control unit connector. If lights do not turn on and remain solid when the flashing light control is actuated, replace the control unit, otherwise check the wiring and the switch.

Steering and suspensions

Heavy steering

STEERING HARDENING

Possible Cause	Operation
Steering hardening	Check the torque of the upper and lower ring nut. If irregularities continue in turning the steering even after making the above adjustments, check the seats in which the ball bearings rotate: if they are recessed or if the balls are squashed, replace them.

Excessive steering play

EXCESSIVE STEERING PLAY

Possible Cause	Operation
Torque not conforming	Check the torque of the upper and lower ring nut. If irregularities continue in turning the steering even after making the above adjustments, check the seats in which the ball bearings rotate: if they are recessed or if the balls are squashed, replace them.

Noisy suspension

NOISY SUSPENSION

Possible Cause	Operation
Malfunctions in the suspension system	If the front suspension is noisy, check: the efficiency of the front shock absorbers; the condition of the ball bearings and relevant lock-nuts, the limit switch rubber buffers and the movement bushings. In conclusion, check the tightening torque of the wheel hub, the brake calliper, the shock absorber disk in the attachment to the hub and the steering tube.

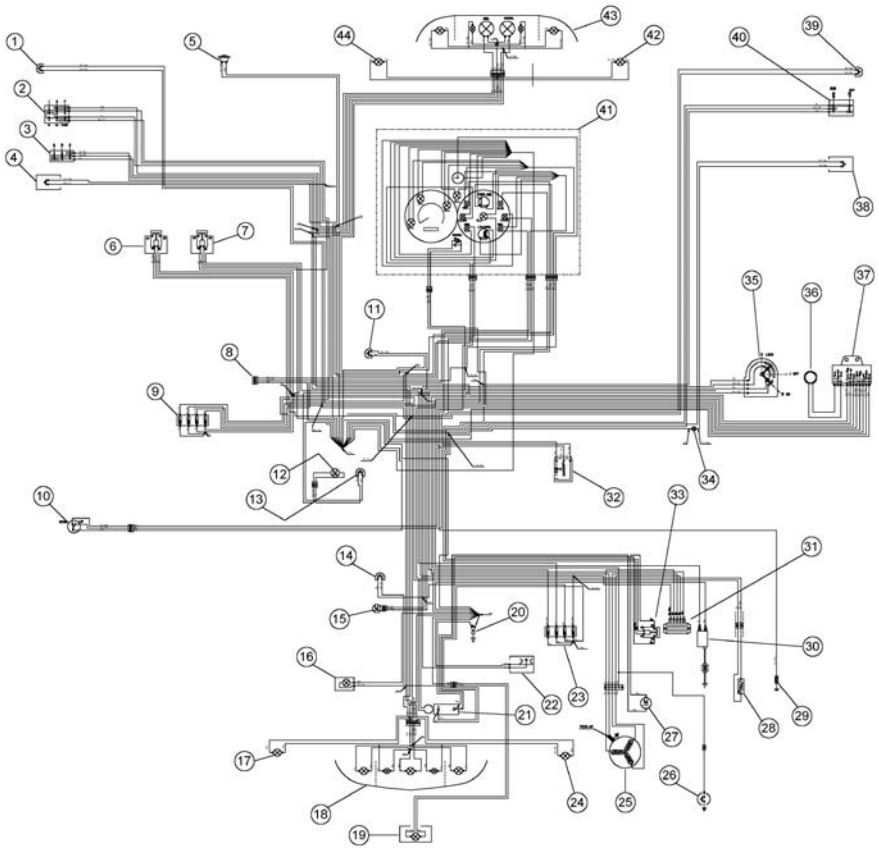
Suspension oil leakage

SUSPENSION OIL LEAKING

Possible Cause	Operation
Seal fault or breakage	Replace the shock absorber Check the condition of wear of the steering covers and the adjustments.

INDEX OF TOPICS

ELECTRICAL SYSTEM	ELE SYS



LEGENDA

	Specification	Desc./Quantity
1	Rear stop light switch	
2	Light switch with flash	
3	Turn signal switch	
4	Horn button	
5	Horn	
6	Engine stop remote control switch	
7	Light remote control switch	
8	Intercom pre-wiring	
9	Front fuse holder box	
10	Side stand switch	
11	Saddle opening button	
12	Electric fan	
13	Thermal switch	
14	light button	
15	Saddle opener actuator	
16	Helmet compartment glass bowl	

	Specification	Desc./Quantity
17	Rear LHS turn signal light	
18	rear headlight	
19	License plate lamp	
20	Frame earth	
21	Battery	
22	Socket 12V	
23	Rear fuse box	
24	Rear RHS turn signal light	
25	Flywheel magneto	
26	Engine oil pressure sensor	
27	Starter motor	
28	Automatic starter	
29	Thermistor	
30	H.V. coil	
31	Voltage regulator	
32	fuel sender	
33	Starter relay	
34	Diode	
35	Ignition key-switch	
36	Immobiliser antenna	
37	Electronic ignition device	
38	Start up button	
39	Front brake stop light switch	
40	Engine stop switch	
41	Front RHS turn signal light	
42	front headlight	
43	Front LHS turn signal light	

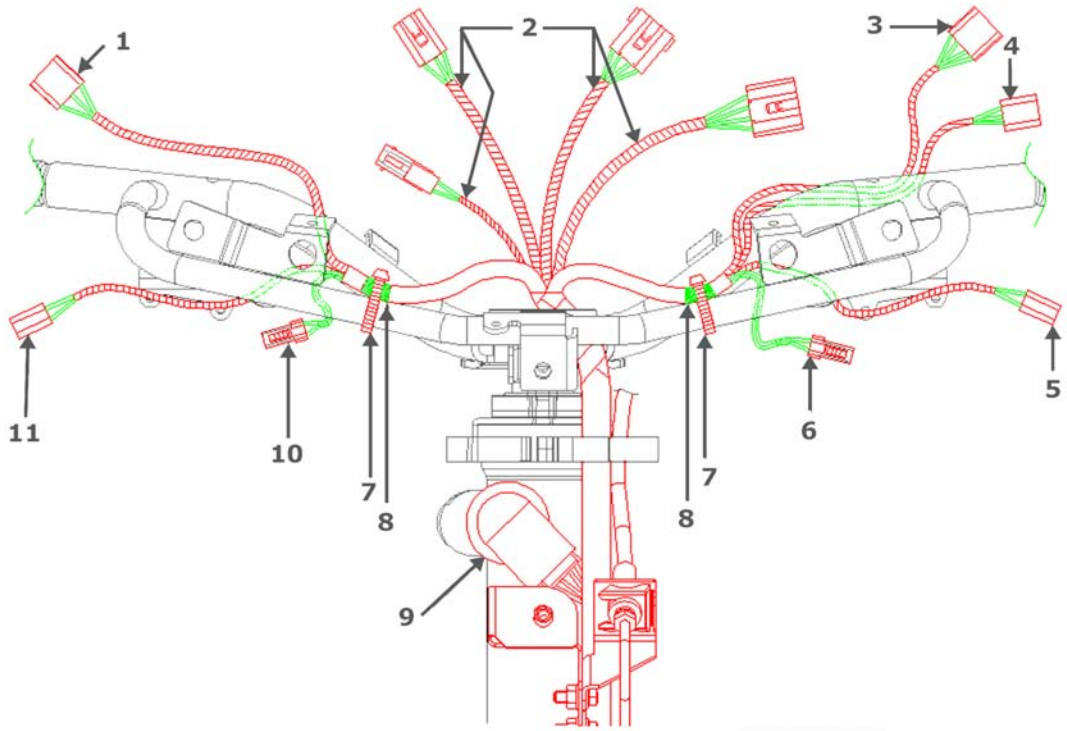
Key

Or: Orange **Lb:** Light Blue **Wh**: White **Bl**: Blue **Ye:** Yellow **Gr:**Grey

Br:Brown **Bl:** Black **Pi**: Pink **Re:** Red **Gre**: Green **Pu:** Purple

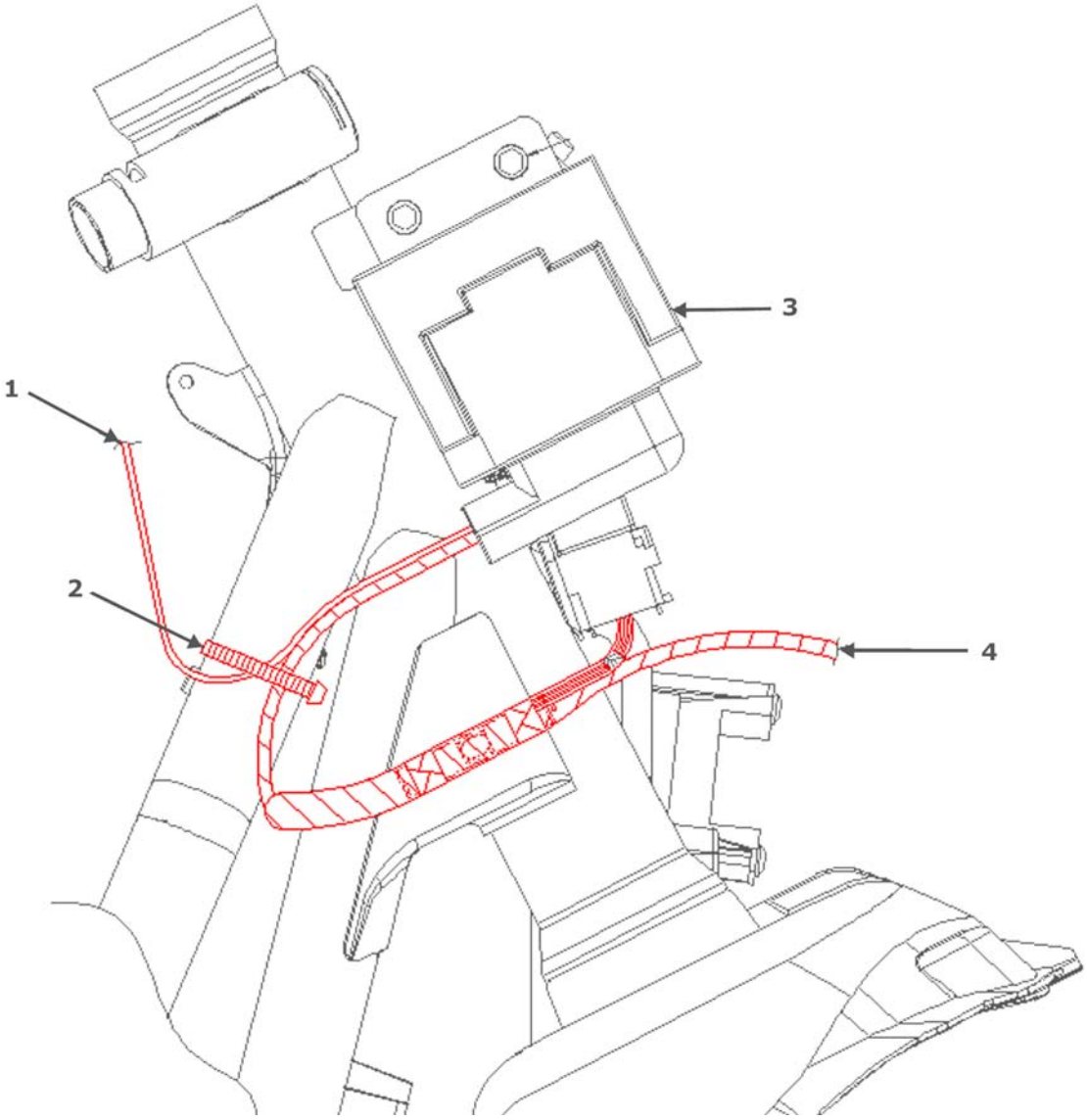
Electrical system installation

Front side



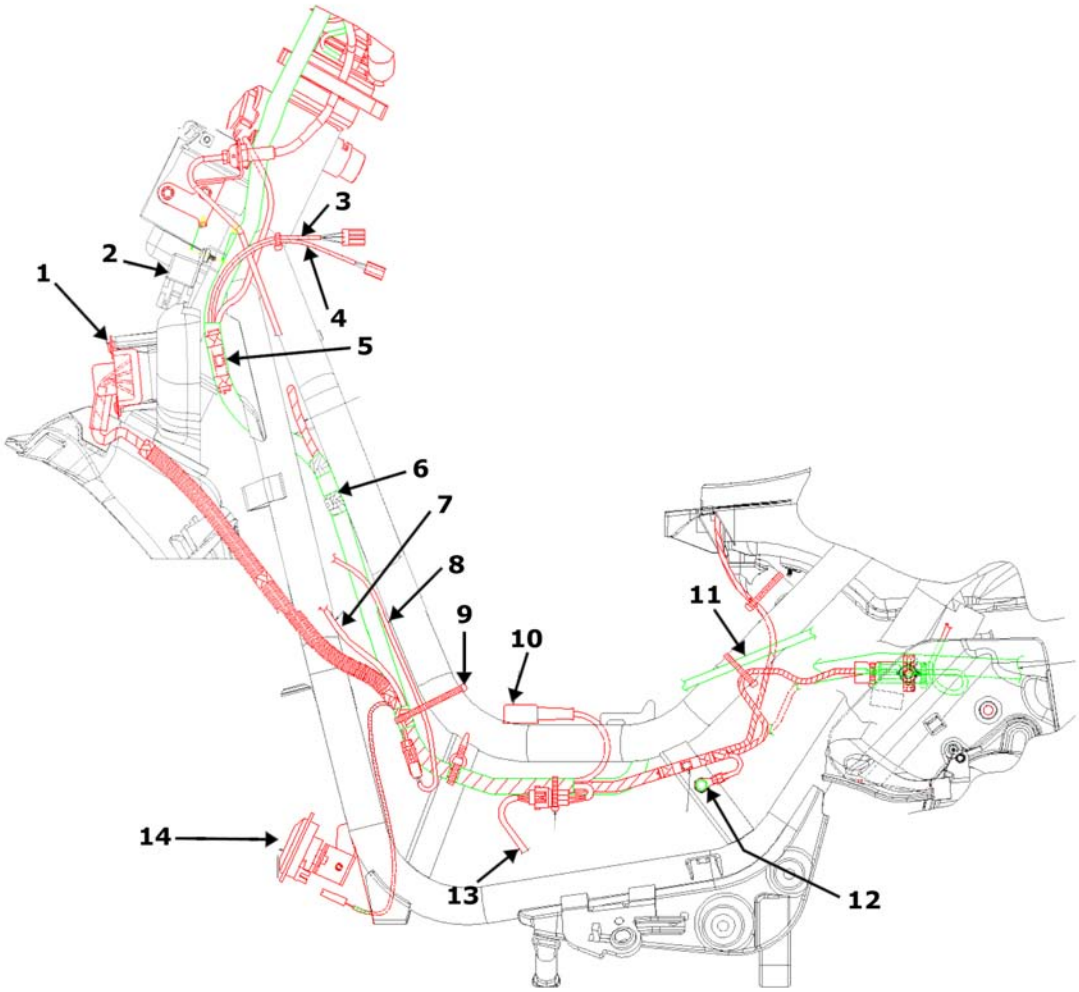
INSTALLING THE ELECTRICAL CIRCUIT

	Specification	Desc./Quantity
1	Installing the electrical circuit	To engine cut-off switch
2	Installing the electrical circuit	To instrument panel
3	Installing the electrical circui	To headlight switch
4	Installing the electrical circuit	To turn signal switch
5	Installing the electrical circuit	To horn button
6	Installing the electrical circuit	To LHS stop light switch
7	Installing the electrical circuit	Clamp
8	Installing the electrical circuit	Red binding
9	Installing the electrical circuit	Key-switch cap
10	Installing the electrical circuit	To RHS stop light switch
11	Installing the electrical circuit	To starter button



INSTALLING THE ELECTRICAL CIRCUIT

	Specification	Desc./Quantity
1	Installing the electrical circuit	To antenna
2	Installing the electrical circuit	Clamp
3	Installing the electrical circuit	Ignition master-box (ECU)
4	Installing the electrical circuit	To headlight

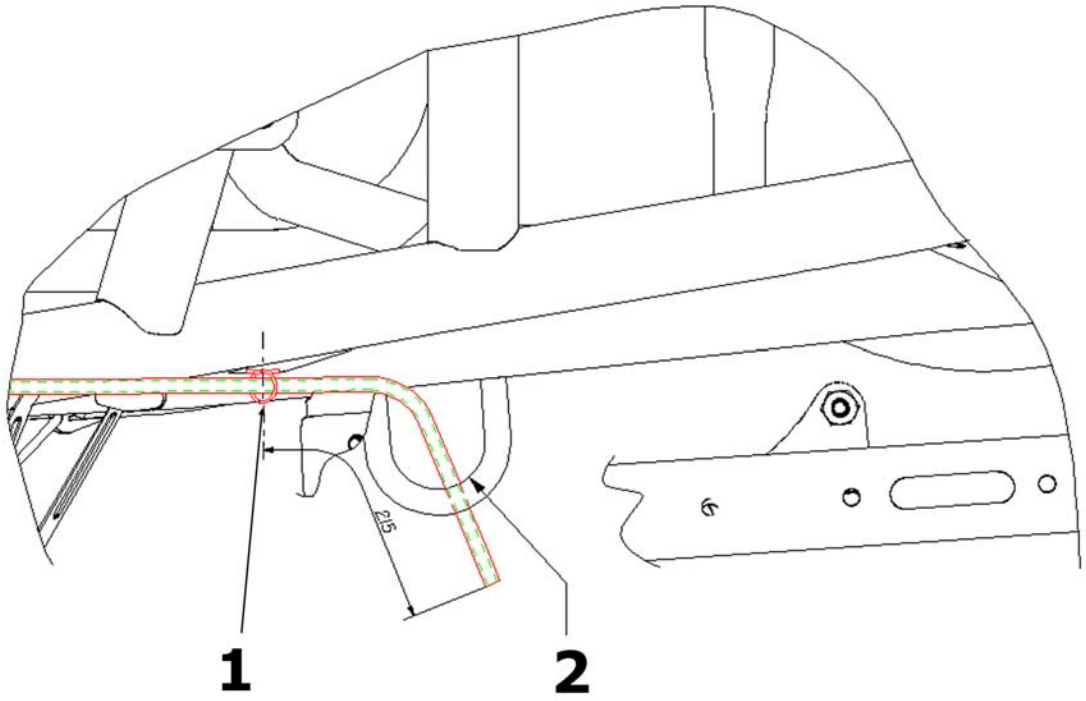


INSTALLING THE ELECTRICAL CIRCUIT

	Specification	Desc./Quantity
1	Installing the electrical circuit	Front fuse holder
2	Installing the electrical circuit	Two relays
3	Installing the electrical circuit	Intercom master-box pre-wiring
4	Installing the electrical circuit	To seat opening button
5	Installing the electrical circuit	Insert in the appropriate hole
6	Installing the electrical circuit	Insert in the appropriate hole
7	Installing the electrical circuit	To radiator thermal switch
8	Installing the electrical circuit	To electric fan
9	Installing the electrical circuit	Clamp
10	Installing the electrical circuit	To fuel level gauge
11	Installing the electrical circuit	Seat opening cable
12	Installing the electrical circuit	Earth cable fixing onto frame.
13	Installing the electrical circuit	To side-stand switch

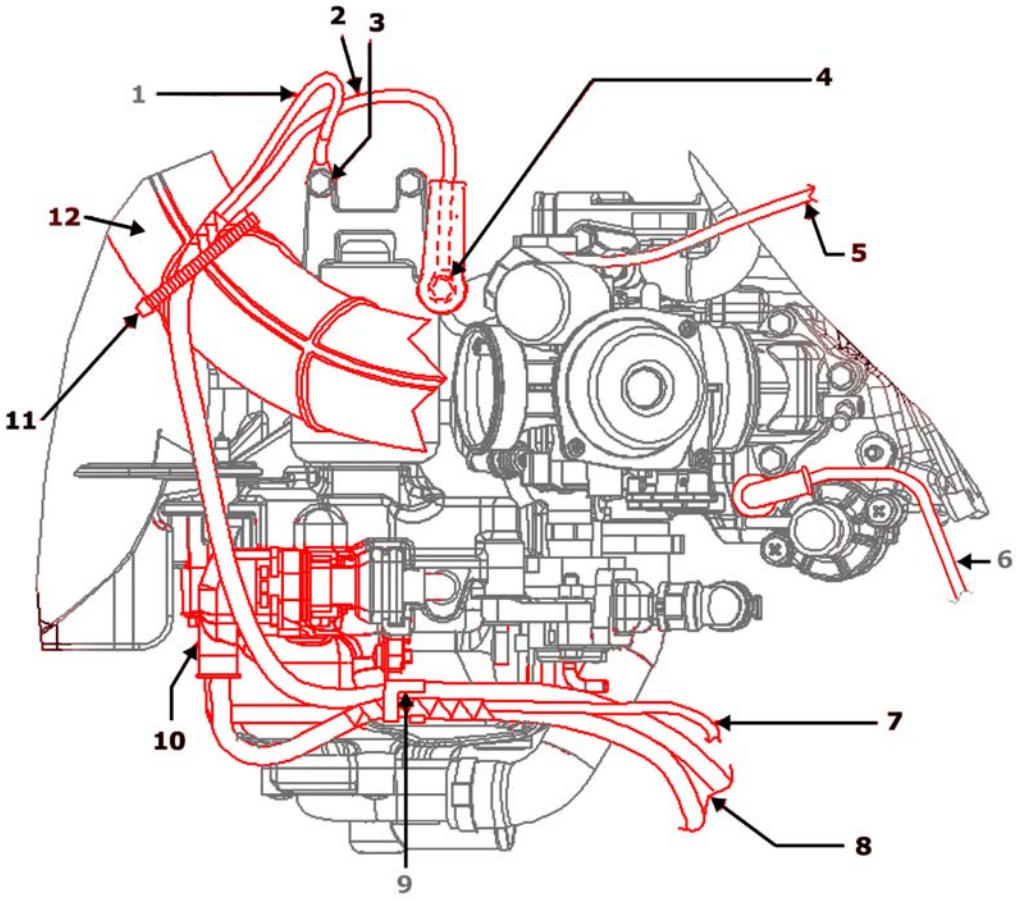
	Specification	Desc./Quantity
14	Installing the electrical circuit	Horn

Back side



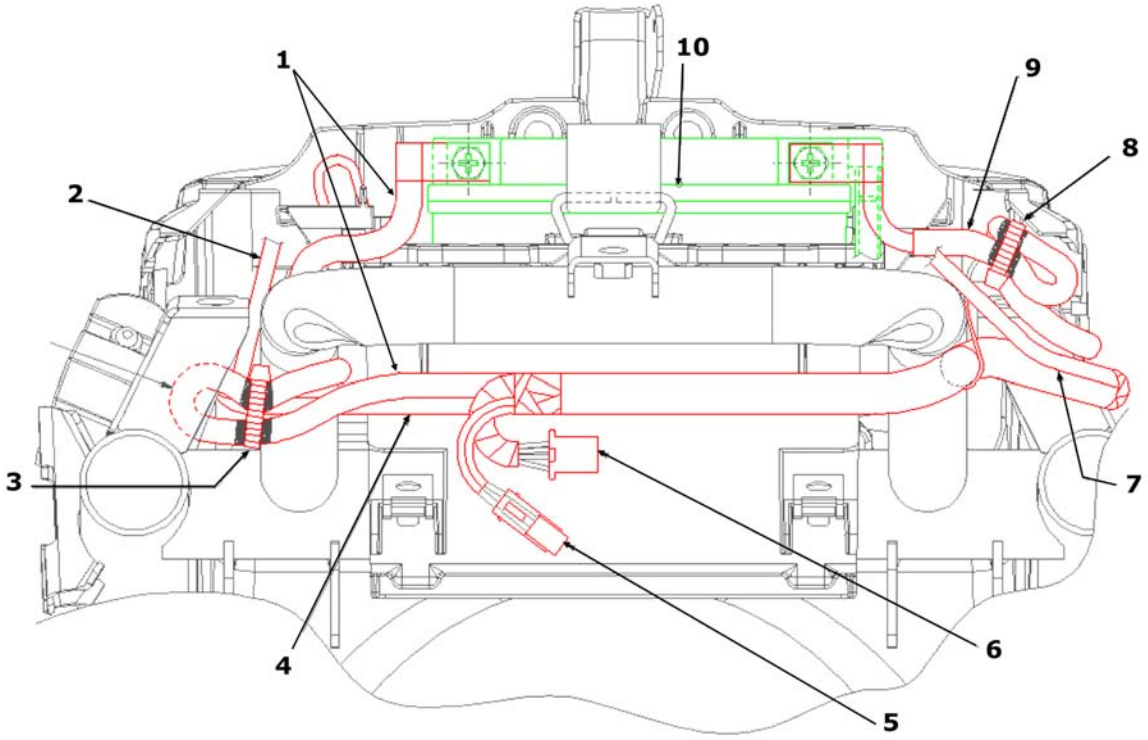
INSTALLING THE ELECTRICAL CIRCUIT

	Specification	Desc./Quantity
1	Installing the electrical circuit	Retaining spring
2	Installing the electrical circuit	Guide the battery breathing tube through the frame hole, as shown.



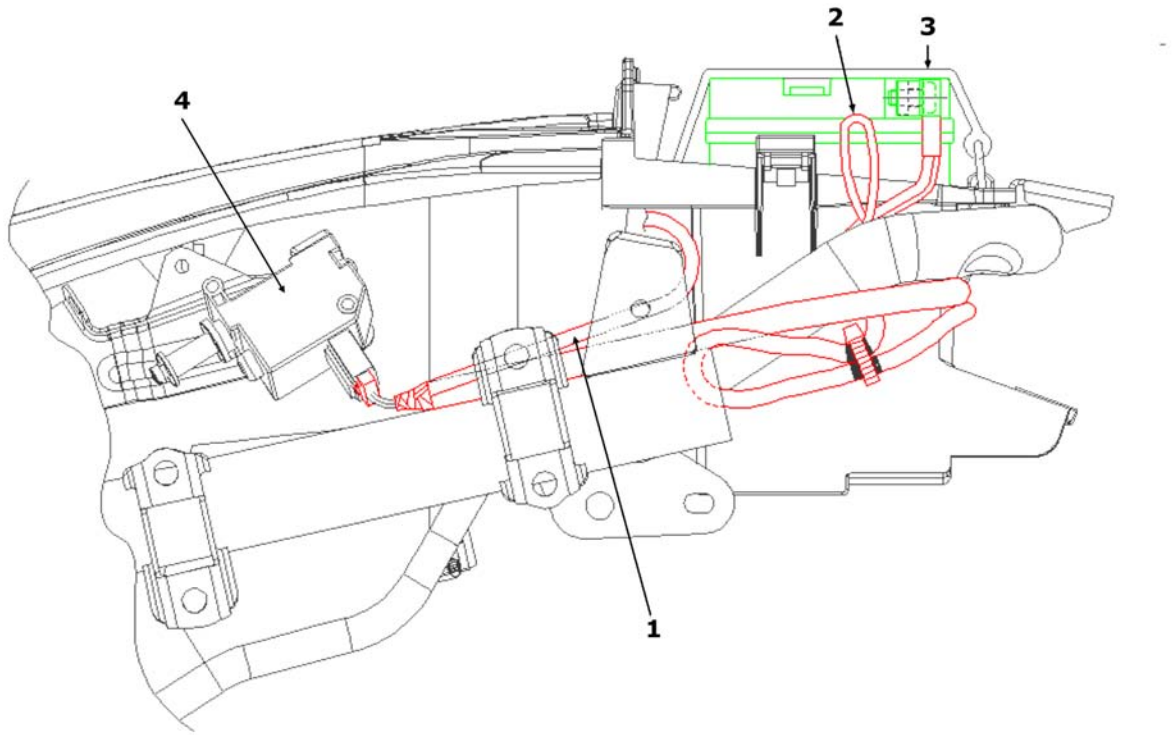
INSTALLING THE ELECTRICAL CIRCUIT

	Specification	Desc./Quantity
1	Installing the electrical circuit	Starter motor earth cable
2	Installing the electrical circuit	Starter motor positive (+) cable
3	Installing the electrical circuit	Screw - tighten up to 10 ÷ 13 Nm
4	Installing the electrical circuit	Screw - tighten up to 6 ÷ 8 Nm
5	Installing the electrical circuit	To automatic choke connection
6	Installing the electrical circuit	Thermistor
7	Installing the electrical circuit	To oil sensor
8	Installing the electrical circuit	To cable harness
9	Installing the electrical circuit	Metallic clamp
10	Installing the electrical circuit	Flywheel connection
11	Installing the electrical circuit	Clamp
12	Installing the electrical circuit	Air filter/carburettor bellow



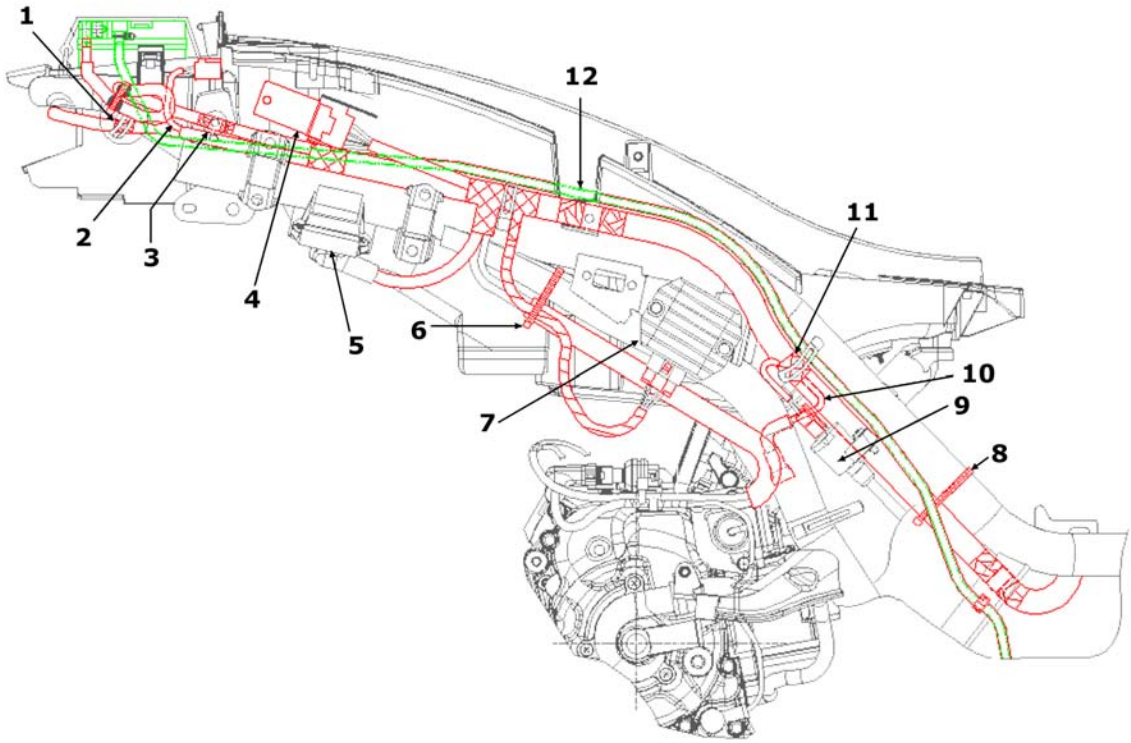
INSTALLING THE ELECTRICAL CIRCUIT

	Specification	Desc./Quantity
1	Installing the electrical circuit	To battery (-)
2	Installing the electrical circuit	To the plafoniera
3	Installing the electrical circuit	Clamp
4	Installing the electrical circuit	To actuator
5	Installing the electrical circuit	To license plate light
6	Installing the electrical circuit	To taillight
7	Installing the electrical circuit	To 12V - 180W power outlet underneath the seat
8	Installing the electrical circuit	Clamp
9	Installing the electrical circuit	To battery (+)
10	Installing the electrical circuit	Battery 12 V/12 Ah



INSTALLING THE ELECTRICAL CIRCUIT

	Specification	Desc./Quantity
1	Installing the electrical circuit	To the plafoniera
2	Installing the electrical circuit	Choke device diagnostic port
3	Installing the electrical circuit	Battery restraining belt
4	Installing the electrical circuit	Seat opening actuator

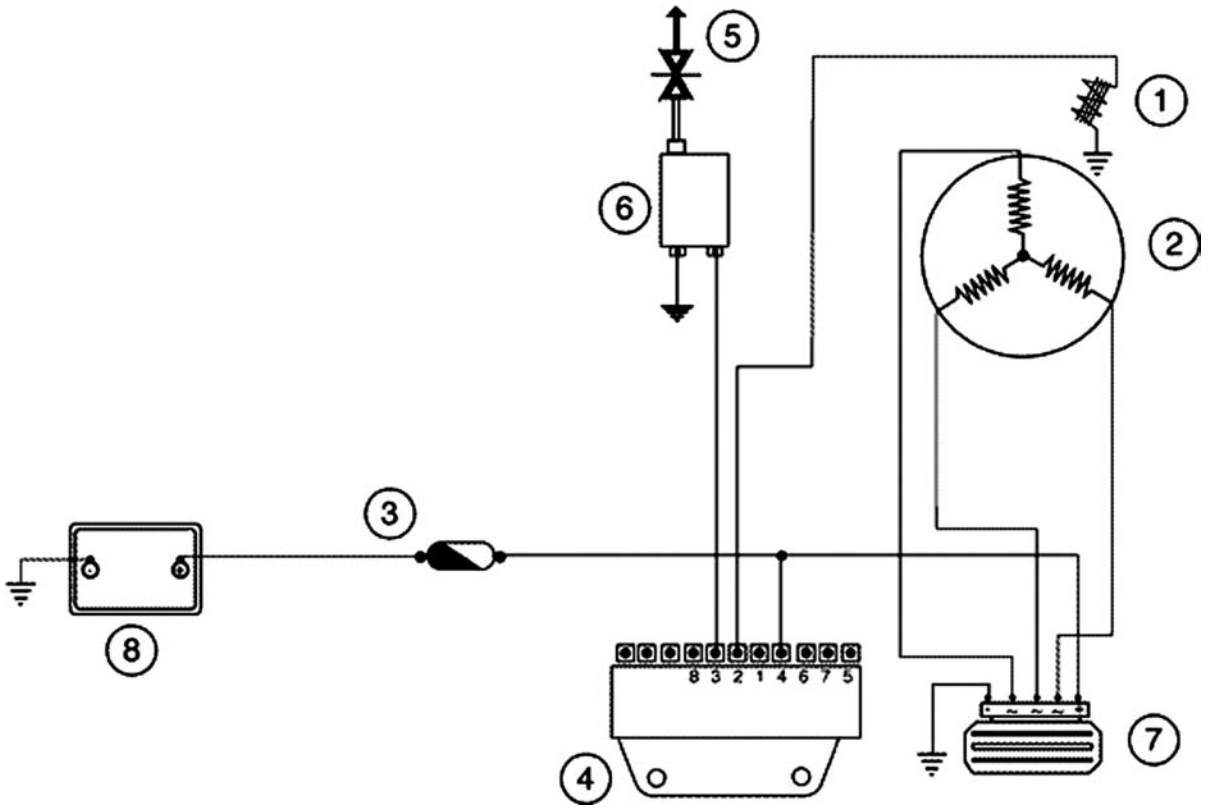


INSTALLING THE ELECTRICAL CIRCUIT

	Specification	Desc./Quantity
1	Installing the electrical circuit	Secure the metallic clamp on the red binding so that the cable harness remains under-neath the frame tube.
2	Installing the electrical circuit	To 12V - 180W power outlet underneath the seat
3	installing the electrical circuit	The clamp must be placed on the aft hole
4	Installing the electrical circuit	Starter relay, 12V - 80A
5	Installing the electrical circuit	Rear fuse-holder
6	Installing the electrical circuit	Clamp
7	Installing the electrical circuit	Rear fuse-holder
8	Installing the electrical circuit	Clamp
9	Installing the electrical circuit	HT coil
10	Installing the electrical circuit	To thermistor
11	Installing the electrical circuit	Insert in the appropriate hole
12	Installing the electrical circuit	Battery breathing tube

Conceptual diagrams

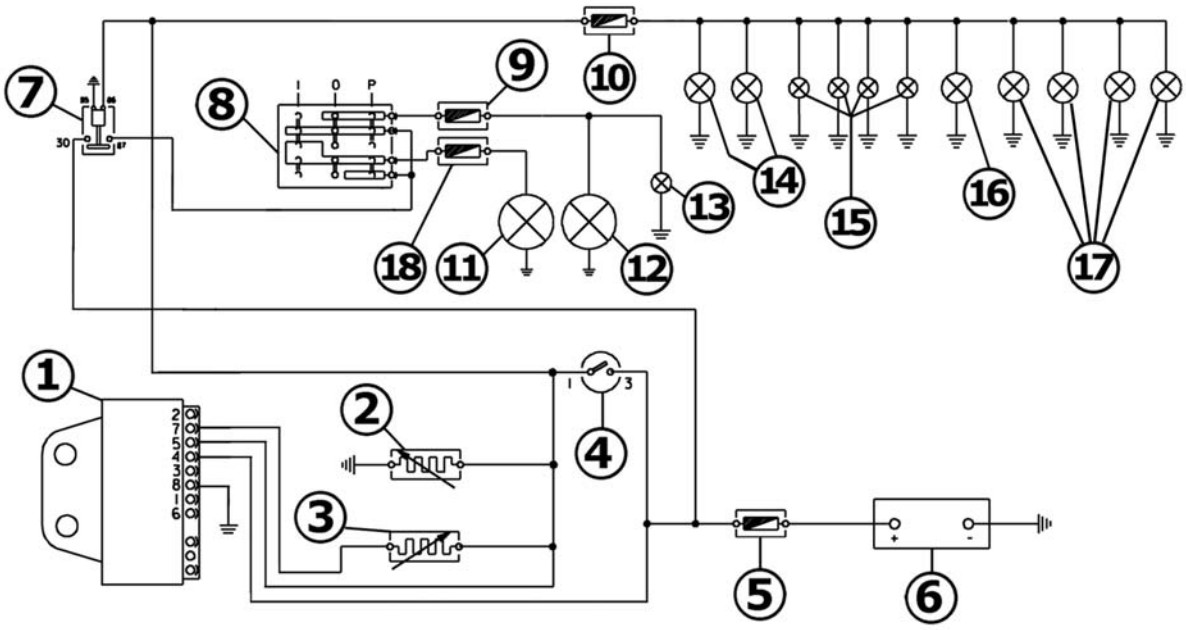
Ignition



IGNITION

	Specification	Desc./Quantity
1	Pick - up	
2	Magneto flywheel	
3	Fuse	15A (N° 7)
4	Electronic ignition device	
5	Spark plug	
6	H.V. coil	
7	Voltage regulator	
8	Battery	12V - 10Ah

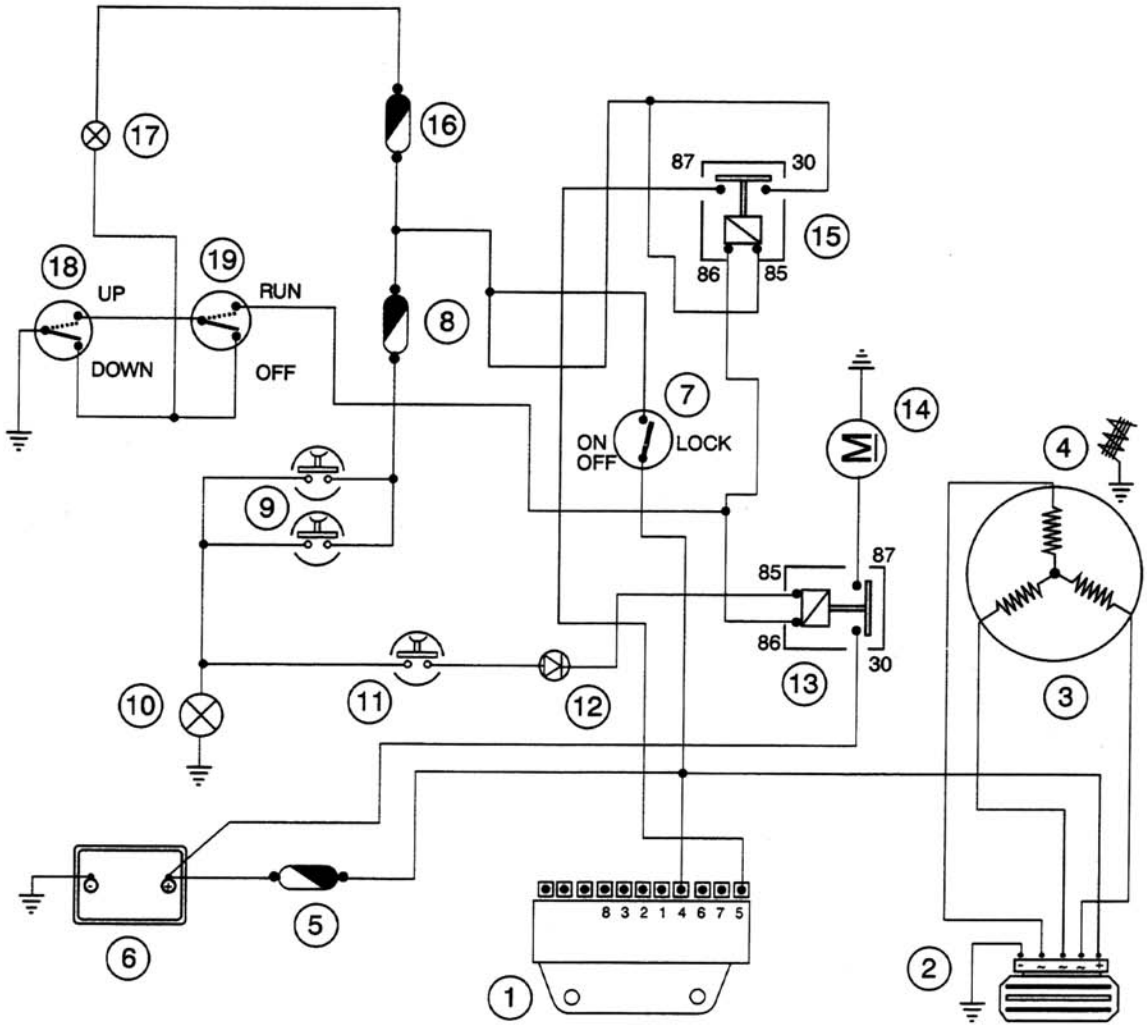
Headlights and automatic starter section



HEADLIGHTS AND AUTOMATIC STARTER SECTION

	Specification	Desc./Quantity
1	Electronic control unit	
2	Carburettor heater	
3	Automatic starter	
4	Key switch	
5	Main fusible	15A
6	Battery	12V-9Ah
7	Headlamp relay	
8	Light switch	
9	High-beam fuse	7,5A
10	Low-beam and dashboard lights fuse	7,5A
11	Low-beam light bulb	12V - 55W
12	High-beam light bulb	12V-55W
13	High-beam warning light	12V - 1,2W
14	Rear side light bulb	12V - 5W
15	Four dashboards illuminating bulbs	12V - 1,2W
16	License plate bulb	12V - 5W
17	Front side light bulb	12V - 5W
18	Low-beam fuse	7,5A

Battery recharge and starting

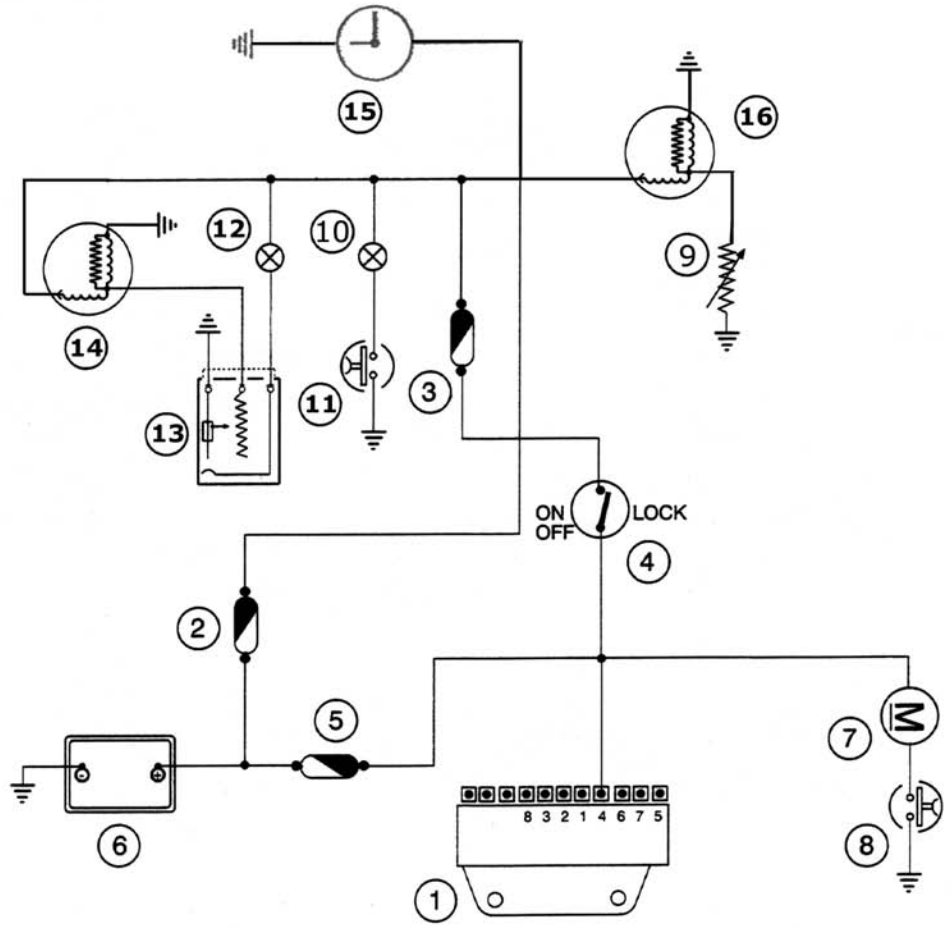


BATTERY RECHARGE AND START-UP

	Specification	Desc./Quantity
1	Electronic ignition device	
2	Voltage regulator	
3	Magneto flywheel	
4	Pick - up	
5	Fuse	15 A (N°7)
6	Battery	12V-12Ah
7	Key switch contacts	
8	Fuse	4A (N° 2)

	Specification	Desc./Quantity
9	Front and rear brake light button	
10	Brake light bulbs	12V-10W
11	Start up button	
12	Diodo	
13	Remote starter switch	
14	Starter motor	
15	Engine stop remote control switch	
16	Fuse	7,5A (N°1)
17	Engine disabled warning light bulb	12V - 1,2W
18	Side stand switch	
19	Engine stop switch	

Level indicators and enable signals section



LEVEL INDICATORS AND ENABLE SIGNALS SECTION

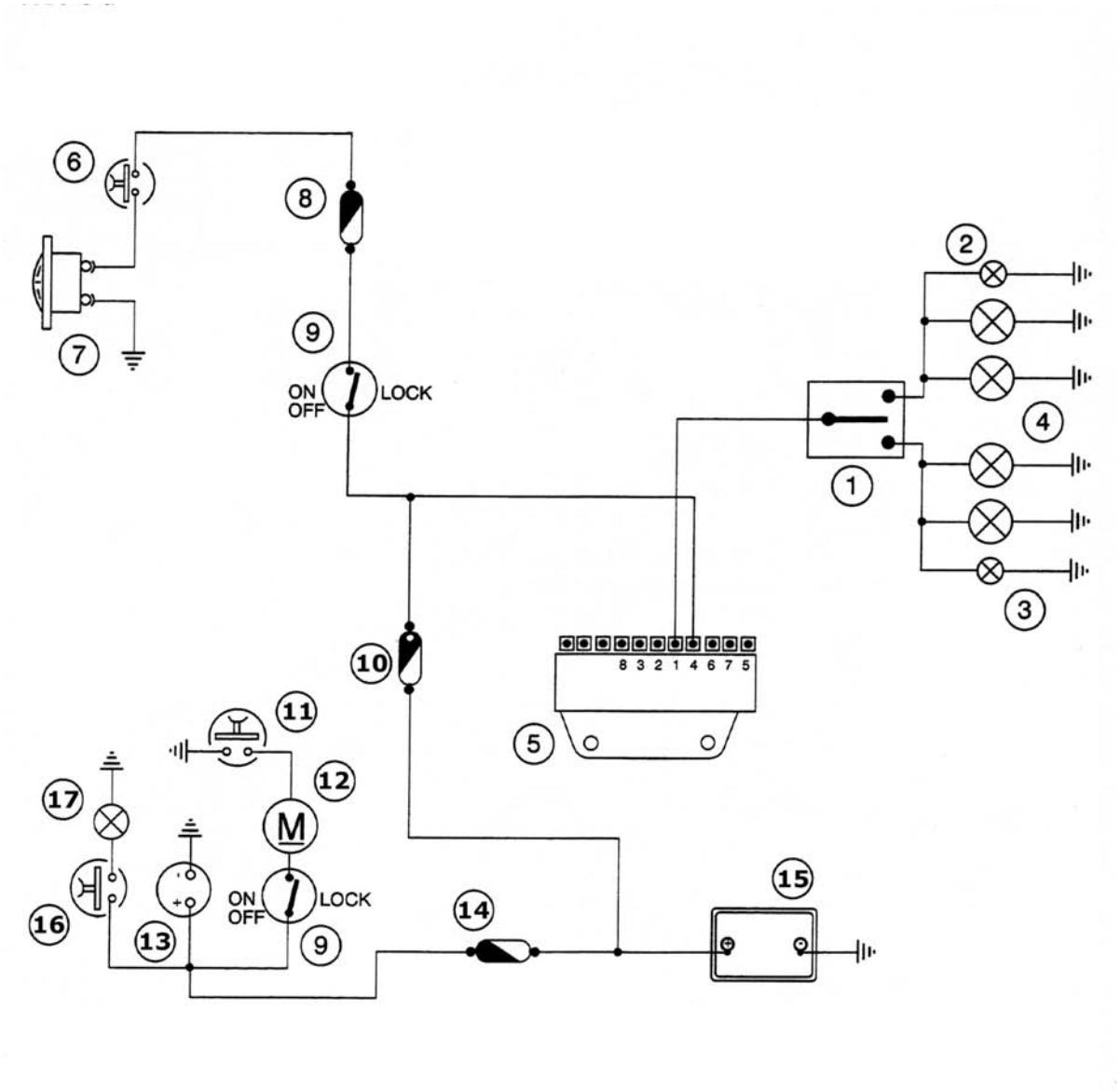
	Specification	Desc./Quantity
1	Electronic ignition device	
2	Fuse	4A (N° 5)
3	Fuse	7,5A (N°1)
4	Key switch contacts	
5	Fuse	15 A (N°7)
6	Battery	12V-12Ah
7	Radiatore electric fan motor	
8	Thermal switch for electric fan	
9	Thermistor	

	Specification	Desc./Quantity
10	Oil Pressure Warning Light Bulb	12V - 1,2W
11	Motor Oil pressure sensor	
12	Reserve Fuel Warning Light Bulb	12V - 1,2W
13	Fuel level sender	
14	Fuel level gauge	
15	Digital clock	
16	Coolant temperature gauge	

Thermal switch

We inform you that a new thermal switch has been introduced starting with frame number ZAPM2300003507739 (X9) ZAPM3620000003383 (X8) ZAPM2850000001025 (Beverly), in order to prevent possible malfunctioning of the thermal switch.

Turn signal lights



DIRECTION INDICATORS, HORN, UTILITIES

	Specification	Desc./Quantity
1	Turn indicator switch	
2	Rh turn indicator warning light bul	12V - 1,2W
3	Lh turn indicator warning light bulb	12V - 1,2W
4	Four turn indicator bulbs	N°4 12V-10W
5	Electronic ignition device	
6	Horn button	
7	Horn	12V
8	Fuse	7,5 A (N°3)
9	Key switch contacts	

	Specification	Desc./Quantity
10	Fuse	15 A (N°7)
11	Saddle electrical opening button	
12	Saddle opening actuator	
13	Plug socket	12 V - 180 W MAX
14	Fuse	15 A (N°8)
15	Battery	12V-12Ah
16	Helmet compartment lighting button	
17	Helmet compartment lamp bulb	12V-5W

Checks and inspections

Immobiliser

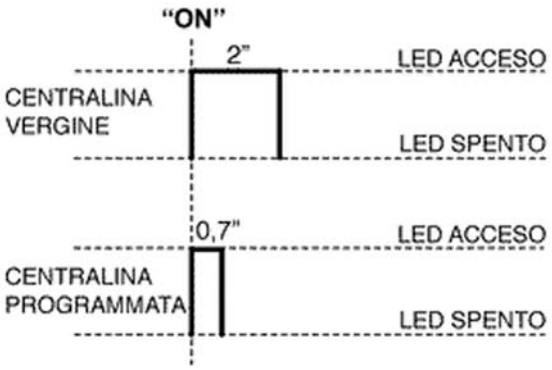
The electronic ignition system is d.c.-fed and comes complete with an immobilizer antitheft system built into the electronic control unit. The ignition system consists of:

- Electronic control unit
- Immobilizer aerial
- Master and service key with built-in transponder
- HV coil
- Diagnostic LED

The diagnostic LED also works as a deterring blinker. This function is activated every time the ignition switch is turned to the "**OFF**" position, when the sidestand is lowered, or the emergency stop switch is set to the "**OFF**" position. It remains activated for 48 hours in order not to affect the battery charge.

When the ignition switch is turned to the "**ON**" position, the deterring blinker function is deactivated. Subsequently, a flash confirms the switching to the "**ON**" status.

The duration of the flash depends on the programming of the electronic control unit (see fig-



ure).

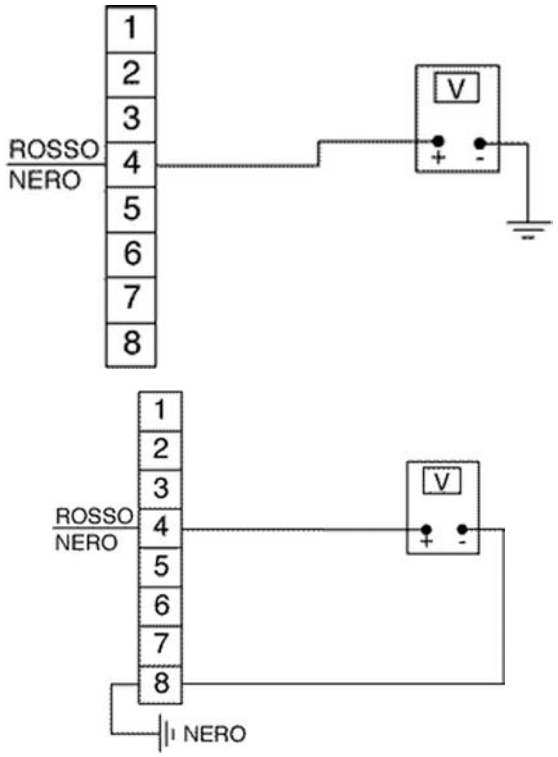
If the LED is out and stays out when the ignition switch is turned to "**ON**", check if:

- Battery voltage is present
- The fuses are in working order, main fuse 15A (N° 7).

If the deterring LED stays out, follow these steps to check that power is supplied to the control unit:

Disconnect the control unit connector and check the following:

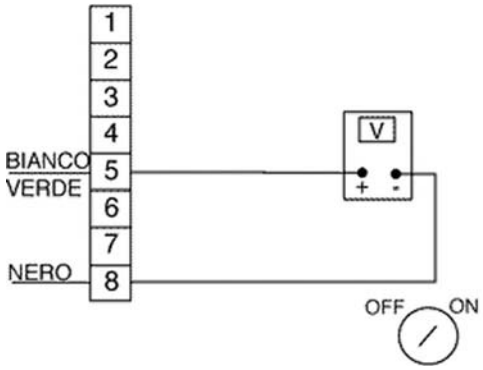
- Battery voltage is present between terminal no. 4 (Red/Black) and earth.
- Battery voltage is present between terminals nos. 4 (Red/Black) and 8 (Negative) as shown in the figure.



- Battery voltage is present between terminals nos. 5 and 8 with the ignition switch in the "**ON**" position, the sidestand is up and the emergency stop switch is in the "**RUN**" position.

If no malfunction is found, replace the control unit, otherwise check the wiring and the following components:

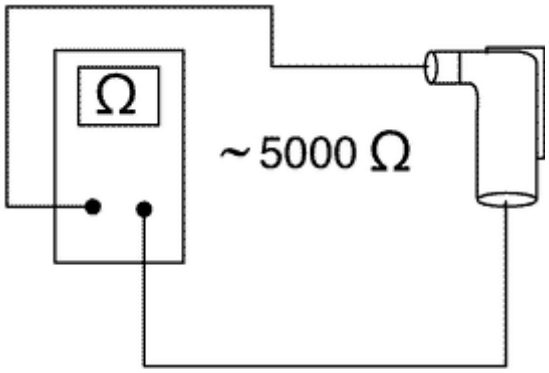
- Engine stop relay switch
- Emergency stop switch
- Sidestand contacts
- Ignition switch contacts



Virgin circuit

When the ignition system is not coded, it allows the engine operation but with a limit of 2.000 rpm; miss is evident when trying to accelerate

The MASTER (Brown coloured) and SERVICE



(Black coloured) keys are required to code the system as follows:

- Insert the MASTER key, set to «ON» and keep this position for 2 seconds (limit values: 1 - 3 seconds).
- Alternately introduce all black keys available switching each key to «ON» for 2 seconds.
- Insert the MASTER key again and set to «ON» for 2 seconds.

The maximum time to change keys is of 10 seconds.

Seven service keys (black coloured) can be programmed within the same storage operation. Sequence and times must be respected; otherwise, repeat the procedures from the beginning.

Once the control unit has been coded, an inseparable matching between control unit and the transponder of the MASTER key is created.

This matching allows performing further service key storage in case of loss, replacement, etc.

Each storage deletes the former one. In case of loss of the service key storage, carefully check the high voltage system shielding:

Shielded cap resistance ~ 5.000 Ω.

In any case it is advisable to use resistive spark plugs.

Diagnostic codes

After the confirmation flash of the switching to «ON» there may follow a warning of coded failures.

This occurs with LED off for 2 seconds, after which diagnostic codes are transmitted with 0.5 second flashes.

After the failure code signal, the LED turns on with solid light to indicate that start up is not possible; see the graph:

Diagnostic code - 2 flashes

If the 2-flash diagnostic code is displayed, proceed as follows:

- Check whether the malfunction persists when the key (including the MASTER key) is changed. If the anomaly persists with any key, detach the control unit aerial connector and check the continuity of the antenna by using the recommended multimeter.

If the value is not as specified, replace the antenna.

If no anomaly is found, replace the electronic control unit.

CAUTION

BEFORE STORING THE DATA ON THE NEW POWER PLANT, CHECK THAT NO ANOMALY CODE IS INDICATED. THIS IS NECESSARY SO THAT YOU DO NOT POINTLESSLY WASTE A NEW POWER PLANT

Specific tooling

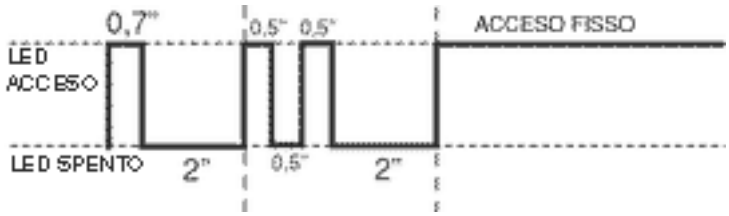
020331Y Digital multimeter

Electric characteristic

Immobolizer antenna

~ 7 ÷ 9 ohm

2 FLASH CODE - Example electronic control unit programmed, transponder absent and/or aerial malfunctioning. **Ignition disabled - Vehicle immobilised**



Diagnostic code - 3 flashes

If the 3-flash diagnostic code is displayed, check if the anomaly persists after inserting the MASTER key into the ignition switch.

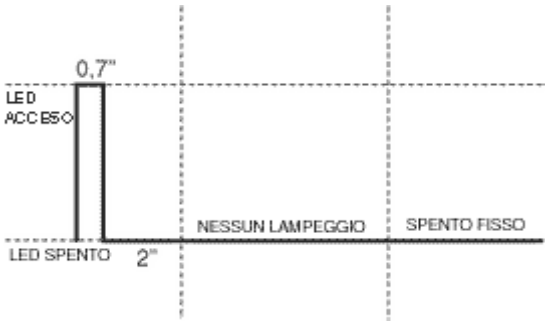
- If the malfunction disappears when the MASTER key is used, proceed to code the service (blue) keys again.
- If the anomaly persists, then the MASTER key and the control unit are not matched. In that case, replace the control unit and proceed to code the keys.

The immobilizer system is in working order when, after turning the ignition switch to «**ON**», one 0.7-second flash is emitted (see chart).

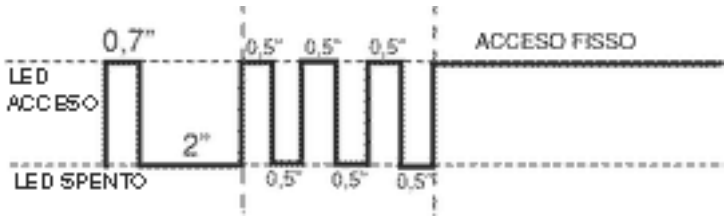
In that case, ignition is possible.

Example - Electronic control unit programmed,
transponder present, key programmed and aerial

in working order. **Ignition enabled (normal operating conditions)**



3 FLASH CODE - Example electronic control unit programmed, aerial in working condition and transponder code unknown. **Ignition disabled - Vehicle immobilised**



Ignition circuit

Ignition system

Once the immobilizer system has been enabled, it is possible to have the spark at the spark plug by the H.V. coil and the signals coming from the Pick-Up.

The basic power supply comes from the battery, the system is calibrated in such a way that any drops of voltage of the battery are perceived by the start up system but are unimportant for the start up system.

The Pick-Up is connected to the control unit by a single wire, thus for the earth circuit the Pick-Up is connected to the control unit by the chassis and the engine earth cable.

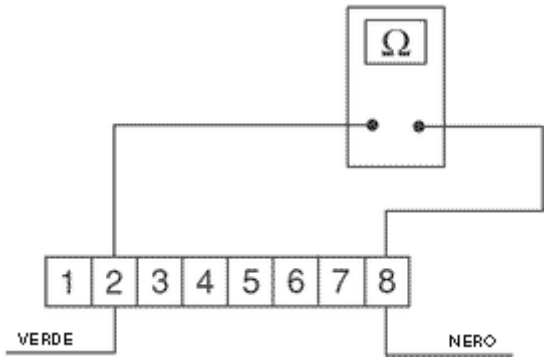
To prevent troubles to the start up system during start up, it is very important to have a good efficiency of the engine-chassis earth connection.

No spark plug

Finding the lack of current to the signaling candle with led ignition possible to proceed like of continuation:

-Control Pick-Up.

Disconnect the control unit connector and check the continuity between the terminal no. 2 (green) and no. 8 (black) The Pick-Up should be as fol-



lows.

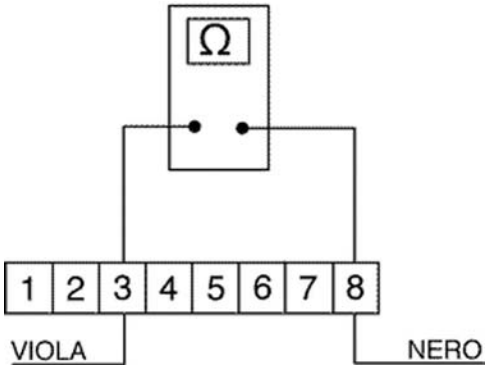
Electric characteristic

Resistance value pick-up

Resistance value pick-up: 105 ÷ 124 ohm

If the circuit is interrupted, repeat the check between the flywheel connector and the and the engine earth (see engine manual). If the measured values are not as specified, replace the pick-up, otherwise repair the wiring.
If, on the other hand, the values are as specified, try replacing the control unit (without programming it) and ensure that the problem has been solved by checking that a spark is produced at the plug. Then proceed to program the control unit.

Checking the HV coil primary circuit
Detach the control unit connector and check continuity between terminals nos. 3 and 8 (see figure).
If the resistance is not as specified, repeat the check directly on the positive and negative terminals of the HV coil primary circuit. If the resistance is as specified, proceed to repair the wiring or restore the connections, otherwise replace the HV coil.

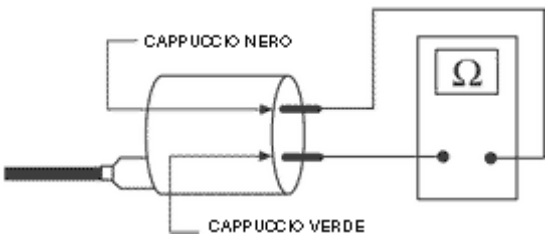


Electric characteristic

Resistance value H.V. coil primary check

Resistance value H.V. coil primary check: 0,4 ÷ 0,5 ohm

- H.T. coil secondary circuit check
Disconnect the spark plug cap from the H.T. cable and measure the resistance between the end of the H.T. cable and the negative terminal of the H.T. coil (see figure).
If the measured values are not as specified, replace the H.T. coil. To obtain a more accurate diagnosis proceed to verify the peak voltage using the multimeter adapter.



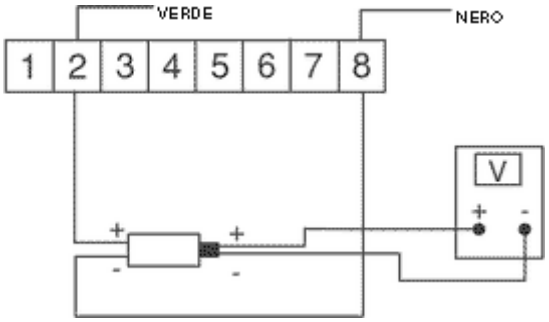
Electric characteristic

Resistance value

H.T. coil secondary circuit resistance value: ~ 2000 ± 300 ohm

Pick-Up.

- Detach the control unit connector and connect the positive terminal to connector no. 2 and the negative terminal to connector no. 8 (see figure).
- Set the multimeter onto 200V.
- Crank the engine by operating the starter motor and measure the voltage produced by the pick-up.
- If the voltage is not as specified, replace the pick-up.



N.B.

THE MULTIMETER MUST BE SET TO MEASURE DIRECT VOLTAGE.

Specific tooling

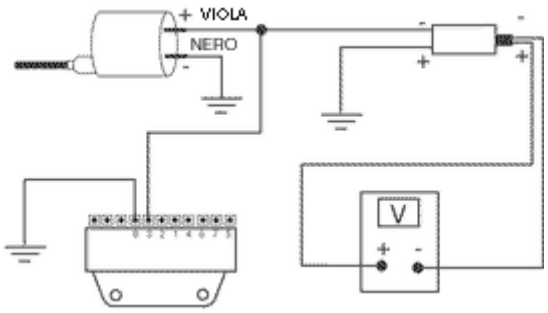
020409Y Multimeter adaptor - Peak voltage measurement

Electric characteristic

Valore tensione

> 5 Volt

With control unit and H.V. coil normally connected, measure the voltage of the coil primary during the start up test by the adapter for peak voltages inserting the positive terminal to earth and the negative to the positive connector of the coil. In case of non-conforming values, replace the control unit.



N.B.

THE PLASTIC CAP OF THE POSITIVE TERMINAL OF THE PRIMARY OF THE H.V. COIL IS IDENTIFIED

BY THE BLACK COLOUR, THE NEGATIVE ONE IS IDENTIFIED BY THE GREEN COLOUR.

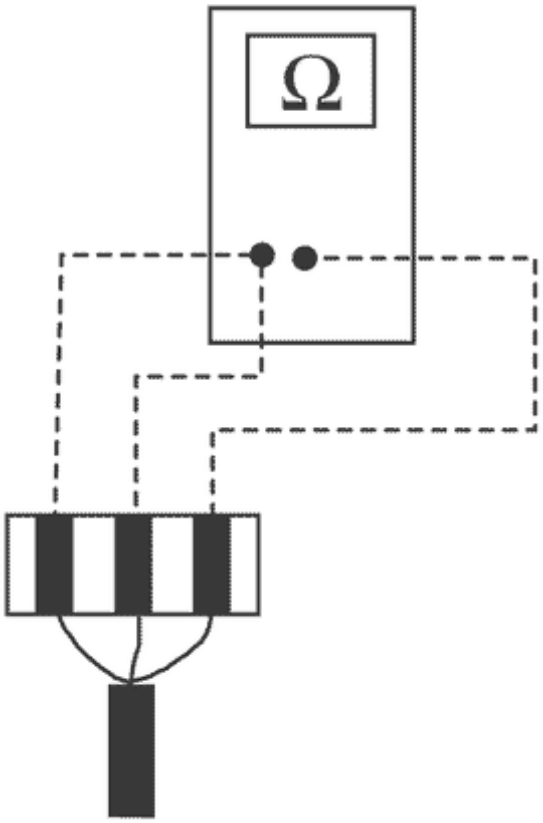
Electric characteristic

Voltage value H.V. coil

Voltage value H.V. coil: > 100 Volt

Stator check

Disconnect the connector from the voltage regulator and check the presence of continuity between each yellow wire with the other two.



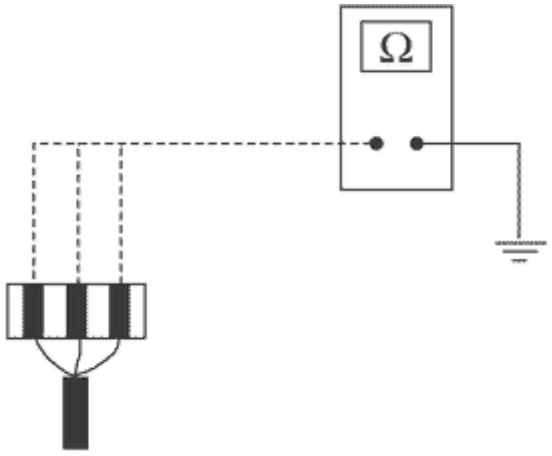
Electric characteristic

Stator check 1

Ohm value: 0,7 ÷ 0,9 Ohm

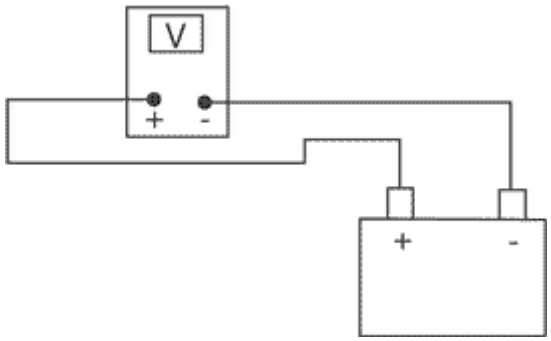
Also check that each yellow wire is insulated from earth.

If non-conforming values are detected, repeat the checks directly on the stator; in case of further wrong values, replace the stator or fix the wiring.



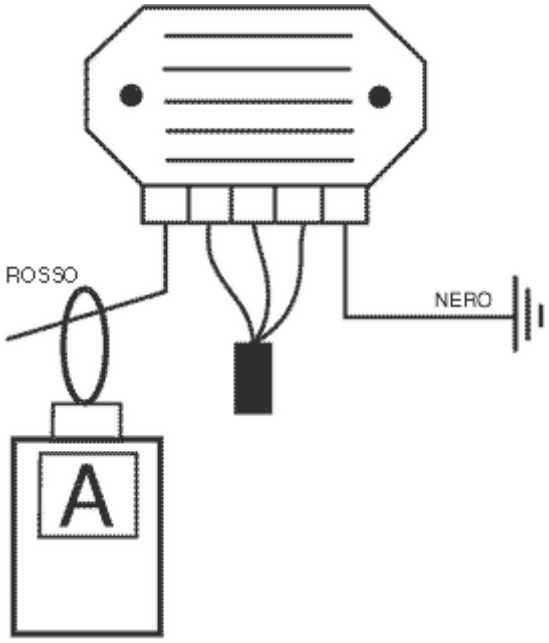
Voltage regulator check

With battery fully charged and lights off, measure the voltage at the battery poles with engine at high speed.
Voltage should not exceed 15.2 Volt.
In case of higher voltage, replace the regulator.
If voltage is less than 14 Volt, check the stator and its wiring.



Recharge system voltage check

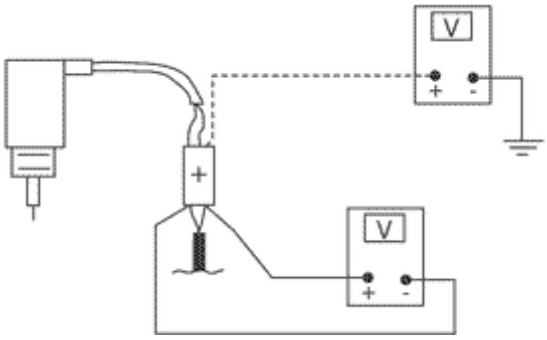
The battery recharge system consists of a three-phase generator and a permanent-magnet fly-wheel.
The generator is directly connected to the voltage regulator.
The latter is in turn directly connected to earth and to the battery positive terminal via the 15A protection fuse (no. 7).
The system is therefore not connected to the ignition key-switch.
The three-phase generator allows for considerable recharging power and, at low rpm, offers a good compromise between supplied power and idle speed stability. For this reason, it is essential that the slow running speed is adjusted as specified.
Connect an ammeter's induction clamp to the positive terminal of the voltage regulator, measure the battery voltage and, by switching the headlight on, wait until the voltage settles at approx. 12 Volts. Start the engine and measure the current supplied by the circuit with headlight on and engine at high rpm.
If the current is below 10A, repeat the test using,



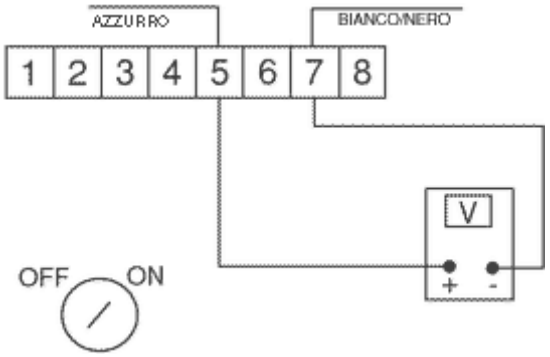
alternately, a new regulator and/or stator.

Choke Inspection

For information on how to carry out the functional and resistive check of the component, refer the engine section of this manual. Regarding the automatic choke device power supply, keep the system connector attached and check that battery voltage is present between the two terminals, **with engine running** (see figure).



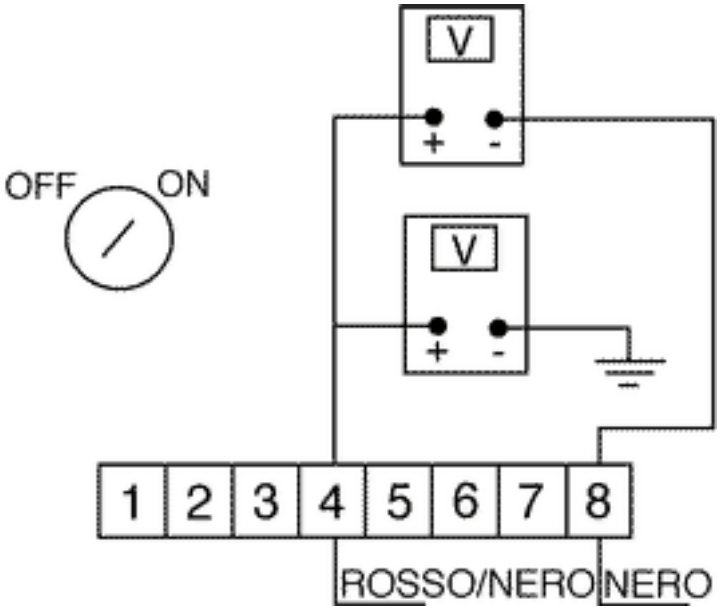
If there is no voltage, connect the multimeter's negative terminal to earth and the positive terminal to the white wire on the automatic choke device. With the ignition switch turned onto the «ON» position, check for the presence of battery voltage. If no voltage is detected, check the wiring connected with the ignition switch and the two fuses 15A (no. 8).
If voltage is present, repeat the check from the ignition control unit connector.
After disconnecting the choke device, start the engine and keep it idling. Check for the presence of voltage by connecting the multimeter's positive terminal to terminal no. 5 (white/green) and its negative terminal to terminal no. 7 (white/black) (see figure).
If no voltage is detected, replace the control unit after verifying the integrity of the fuses, otherwise check the wiring between the choke and the electronic control unit and if necessary proceed by replacing the choke device.



Turn signals system check

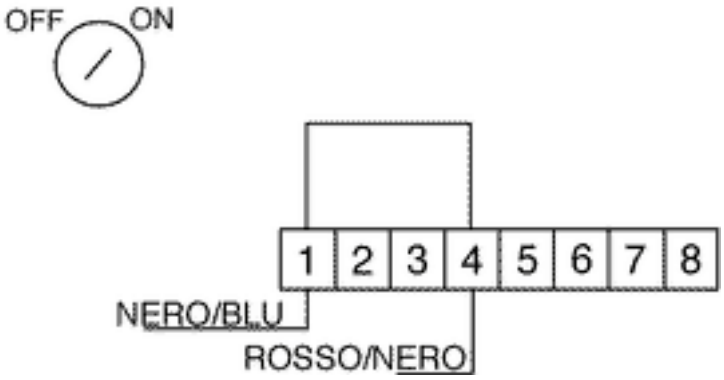
If the turn signal lights fail to operate, proceed as follows:

- Detach the control unit connector and check for potential difference at terminal no. 4 (red/black) with respect to earth (p.d. must be equal to battery voltage).
- Check that the same p.d. (battery voltage) is present between terminals no. 4 and no. 8 (black).
- Repeat the same check between terminals no. 5 (white/green) and no. 8 (black) with the ignition switch turned to the «**ON**» position, the side-stand retracted, and the emergency cut-off switch in the «**RUN**» position.



If no voltage is detected, check the wiring, the connections and the integrity of the main 15A fuse; otherwise proceed as follows:

- Use a jumper to connect terminals no. 1 (black/blue) and no. 4 (red/black) (see figure) and, operating the turn signal switch, alternating left and right hand-side, ensure that the turn signal lights light up.
- If so, the control unit is defective and must be replaced. Otherwise check the wiring between the control unit and the turn signal switch, and then repeat the test
- If the wiring is intact and the turn signal lights still fail to operate correctly, replace the turn signal switch.



Lights list

LIGHT BULB TABLE

	Specification	Desc./Quantity
1	High-beam light bulb	**Type:** HALOGEN (H7) **Power:** 12V - 55W **Quantity:** 1
2	Low-beam bulb	**Type:** HALOGEN (H7) **Power:** 12V - 55W **Quantity:** 1
3	Front parking light	**Type:** ALL GLASS **Power:** 12V - 5W **Quantity:** 2
4	Instrument panel lighting bulb	**Type:** ALL GLASS **Power:** 12V - 2W **Quantity:** 5
5	Front turn indicator bulb	**Type:** Spherical **Power:** 12V - 10W **Quantity:** 1 RIGHT + 1 LEFT
6	Helmet compartment light bulb	**Type:** CYLINDRIC **Power:** 12V - 5W **Quantity:** 1
7	Rear turn indicator bulb	**Type:** Spherical **Power:** 12V - 10W **Quantity:** 1 RIGHT + 1 LEFT
8	Taillight bulb	**Type:** SPHERICAL **Power:** 12V - 3W **Quantity:** 2
9	Stop light bulb	**Type:** ALL GLASS **Power:** 12V - 10W **Quantity:** 1
10	License plate light bulb	**Type:** ALL GLASS **Power:** 12V - 5W **Quantity:** 1

Specification	Desc./Quantity

Fuses

The electrical equipment is protected by:

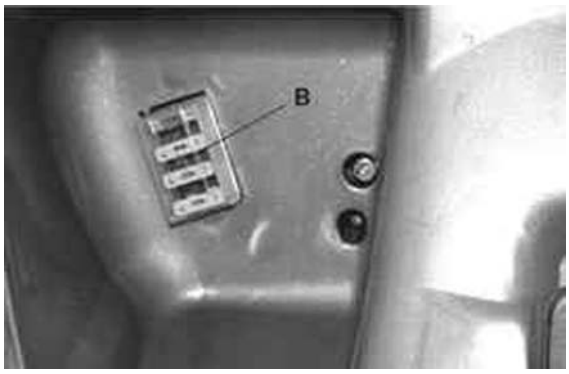
1. Four fuses "**A**" protecting the outside electrical socket, located under the right-hand side panel.

2. Four fuses "**B**" protecting the different circuits, located in the upper left portion of the glove compartment.

The tables show the positions and specifications of the fuses installed on the vehicle.

CAUTION

BEFORE REPLACING THE BLOWN FUSE, TRY TO ELIMINATE THE FAULT THAT HAS CAUSED IT TO BLOW. NEVER TRY TO REPLACE A FUSE USING DIFFERENT MATERIAL (FOR EXAMPLE A PIECE OF ELECTRIC WIRE) OR A FUSE WITH HIGHER AMPERAGE.



FUSES A

	Specification	Desc./Quantity
1	Diagnostic LED, Clock	N.1 4A
2	Headlight (high/low beam bulb)	N.1 10A
3	General	N.1 15A
4	Helmet compartment lamp, 12V socket, saddle electrical opening actuator	N.1 15A

FUSES B

	Specification	Desc./Quantity
1	Electric stand prewiring, starter relay switch coil, engine stop relay coil, engine disabled warning light, oil pressure warning light, reserve fuel warning light, coolant temperature warning light	N.1 7,5A
2	Brake light bulb, starter relay switch inhibitor	N.1 4A
3	Horn, passing function	N.1 7,5A
4	Analogue instrument panel light bulbs, number-plate light bulb, front and rear parking	N.1 4A

Specification	Desc./Quantity
light bulbs	

Sealed battery

If the vehicle is provided with an airtight battery, the only maintenance required is the check of its charge and recharging, if needed.

These operations should be carried out before delivering the vehicle, and on a six-month basis for storage with open circuit.

Besides upon pre-delivery it is therefore necessary to check the battery charge and recharge it, if required, before storing the vehicle and afterwards every six months.

INSTRUCTIONS FOR THE RENEWAL RECHARGE AFTER OPEN-CIRCUIT STORAGE

1) Voltage check Before installing the battery on the vehicle, perform an open-circuit voltage check using a conventional tester.

- If voltage exceeds 12.60 V, the battery may be installed without any renewal recharge.
- If voltage is below 12.60 V, a renewal recharge is required as explained at 2).

2) Constant-voltage battery instructions

- Constant voltage charge equal to 14.40 - 14.70V
- Initial charge current equal to 0.3 - 0.5 x rated capacity
- Charge time:

Recommended 10 - 12 h

Minimum 6 h

Maximum 24 h

3) Constant-current battery instructions

- Charge current equal to 1/10 of the battery rated capacity
- Charge time: 5 h

CAUTION

NEVER USE FUSES HAVING A HIGHER CAPACITY THAN THE RECOMMENDED VALUE. USING FUSES WITH INADEQUATE CAPACITY MAY CAUSE DAMAGES TO THE VEHICLE OR EVEN CAUSE FIRE HAZARDS.
CHARGE THE BATTERY BEFORE USE TO ENSURE OPTIMUM PERFORMANCE. FAILURE TO SUITABLY CHARGE THE BATTERY BEFORE ITS FIRST USE AT A LOW ELECTROLYTE LEVEL WILL CAUSE AN EARLY FAILURE OF THE BATTERY.
IF THE VEHICLE IS NOT USED FOR A CERTAIN PERIOD (1 MONTH AND MORE), THE BATTERY NEEDS PERIODICAL RECHARGING.
THE BATTERY RUNS DOWN TOTALLY WITHIN THREE MONTHS. WHEN REINSTALLING THE BATTERY ON THE VEHICLE, BE CAREFUL NOT TO INVERT CONNECTIONS, CONSIDERING THAT THE EARTH WIRE (BLACK) MARKED (-) MUST BE CONNECTED TO THE -NEGATIVE TERMINAL, WHEREAS THE OTHER TWO RED WIRES MARKED (+) MUST BE CONNECTED TO THE TERMINAL MARKED WITH +POSITIVE SIGN.

WARNING

WHEN THE BATTERY IS DEEPLY DISCHARGED (FAR BELOW 12.6V), 5 HOURS' RECHARGING MAY NOT BE ENOUGH TO OBTAIN OPTIMUM PERFORMANCE.
IN THESE CONDITIONS, HOWEVER, TO AVOID DAMAGING THE BATTERY BEYOND REPAIR, IT IS ESSENTIAL NOT TO RECHARGE IT FOR MORE THAN 8 CONSECUTIVE HOURS.

Keep the battery clean, especially the top; coat the terminals with Vaseline.

Routine battery charging with the battery off the vehicle must be performed with battery charger 020333Y (single) or 020334Y (multiple), positioning the battery charge selector in relation to the type of battery (i.e. with a current equivalent to 1/10 of the battery rated capacity). Ensure you connect up to the battery with the correct polarity (+ to + and - to -).

Dry-charge battery

BATTERY START UP WITH DRY CHARGE

- Remove the battery ventilation duct closing cap and remove the caps from the single elements.
- Fill the battery with electrolyte having a density of 1.270+/-0.01 Kg/l (corresponding to 31+/-1 Bé) with minimum ambient temperature of 15 °C, up to the top level indicated on the single block.
- Slightly tilt the battery to remove any air bubbles formed during the filling.
- Place the caps on the filling holes of the single elements without tightening them and let the battery stand. During this phase, the battery undergoes a gasification phenomenon and temperature rises.
- Let it stand until ambient temperature is reached again (this phase may require up to 60 minutes).
- Slightly tilt the battery to favour the removal of any air bubbles, then restore the levels using the same electrolyte.

Note: This is the last time that electrolyte can be added. Future top ups must be made using only distilled water;

- Within 24 hours, refill as follows:
- Connect the battery charger terminals according to the right polarity;
- Using the battery charger dwg. 020333Y and/or dwg. 020334Y, select the battery capacity;
- If the battery charger is not available, charge the battery with a constant current of 1/10 of the rated capacity (for example for a battery with rated capacity of 9Ah, the charge current must be 0.9-1.0A), for approx. 4-6 hours.

Note: Batteries stored for a long time can require longer times. Battery chargers dwg. 020333Y and dwg. 020334Y have an automatic protection that stops the recharge after 12 hours to prevent overheating the battery. In this case, the turning on of the green led does not indicate the end of the charge but the start of the safety system.

- Let the battery stand with open circuit for approx. 4-6 hours, then check the voltage using a normal

tester.

- If the open circuit voltage is more or equal to 12.6V, the battery charge is good. Slightly tilt the battery to eliminate any air bubbles formed while recharging.
- Check the electrolyte level again, restore if required up to the tol reference using distilled water, tighten the caps of the single elements and install it on the vehicle.
- If lower voltages are detected, recharge the battery for 4-6 hours more as described above.

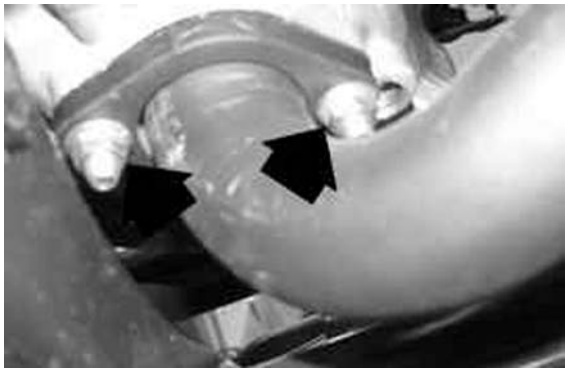
Note: With battery charger dwg. 020334Y you can check the battery charge level by the function Check. The value shown on the display must be higher than that indicated in the table; if not, recharge as described above.

INDEX OF TOPICS

ENGINE FROM VEHICLE	ENG VE

Exhaust assy. Removal

- Loosen the two mountings of the exhaust manifold at the cylinder head.



- Loosen the 3 screws attaching the muffler to the supporting arm. - Remove the muffler assembly.

To refit, carry out the removal operations in reverse order, observing the prescribed tightening torques.

Locking torques (N*m)

Nut for fixing muffler to the support arm 27 ÷ 30 Retaining nut for muffler to cylinder head 16 ÷ 18

Removal of the engine from the vehicle

- Disconnect the battery.
- Remove seat, side fairings, and footrests.
- Drain coolant.
- Remove the silencer assembly.
- Remove the silencer mounting bracket.
- Remove the rear wheel.
- Remove the shock-absorbers lower fixings.
- Remove the throttle cable.
- Detach the air filter bellow and manifold shown

in the figure.

- Detach engine earth cable.
- Disconnect the electrical devices on the carburettor and the starter motor power cord.
- Detach the inlet and outlet carburettor fuel lines and the cooling circuit hoses (head outlet and thermostat inlet).
- Remove the canister safety valve vacuum hose.
- Detach the spark plug H.T. cable.
- Detach the generator wiring from the vehicle's electrical circuit.
- Remove the swing-arm from the engine pivoting.
- The engine may now be removed.

WARNING

PERFORM THESE OPERATION WITH THE ENGINE COLD.

WARNING

BE VERY CAREFUL WHEN HANDLING FUEL.

CAUTION

WHEN INSTALLING THE BATTERY, CONNECT THE POSITIVE CABLE BEFORE CONNECTING THE NEGATIVE ONE

- For refitting the engine onto the vehicle, follow the above operations in the reverse order, complying with the tightening torques given in the Characteristics chapter.
- Check engine oil level and top-up with recommended type as required.
- Fill-up the cooling system.
- Carry out the inspection of throttle and electrical devices.

CAUTION

TAKE CARE NOT TO INVERT THE POSITION OF THE TWO ACCELERATOR CONTROL TRANSMISSIONS. CHECK THAT BOTH SHOW A SLIGHT PLAY WITH THE VALVE IN CONTACT WITH THE REGISTER.

See also

Seat
Side fairings
Footrest
Exhaust assy. Removal
Removal

Removing the rear wheel
Swing-arm

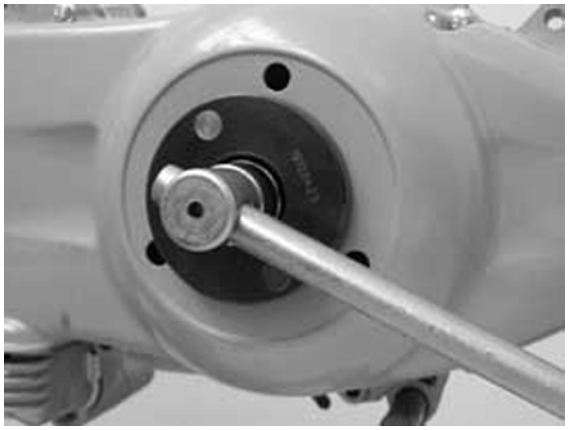
INDEX OF TOPICS

ENGINE	ENG

Automatic transmission

Transmission cover

- To remove the transmission cover it is necessary to remove the plastic cover first, by inserting a screwdriver in the slotted holes. Using the clutch bell lock wrench shown in the figure, remove the driven pulley shaft locking nut and washer.



Specific tooling

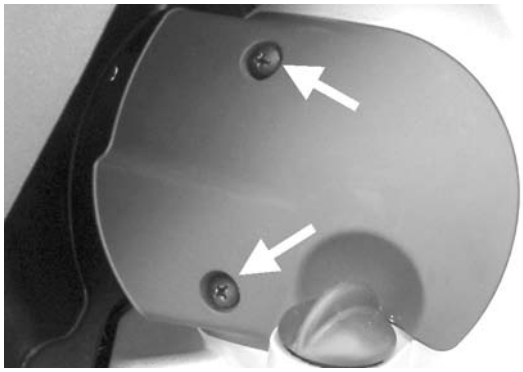
020423Y driven pulley stop wrench

- Remove the cap/bar of the engine oil filling hole.
- Remove the 10 screws.
- Remove the transmission cover.

If this operation is performed directly on the vehicle, it is necessary to remove the transmission compartment cooling air sleeve first.

Air duct

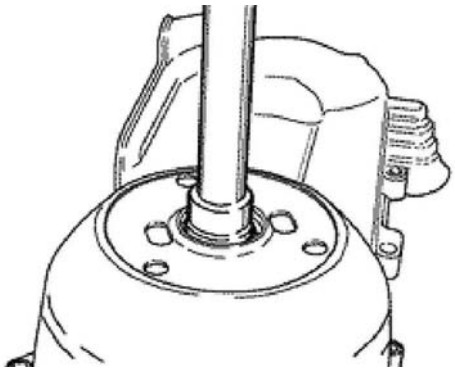
- Remove the transmission compartment air intake cover shown in the photograph.



Removing the driven pulley shaft bearing

- Remove the clip from the inside of the cover.

- Remove the bearing from the crankcase by means of:



Specific tooling

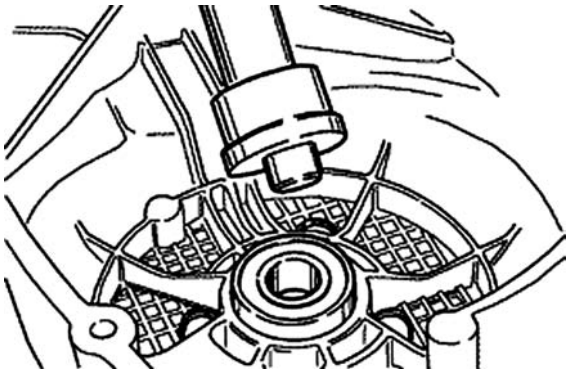
020376Y Handle for adaptors

020375Y Adapter 28 x 30 mm

020412Y 15 mm guide

Refitting the driven pulley shaft bearing

- Slightly heat the crankcase from the inside so as not to damage the painted surface.
- Insert the bearing in its seat.
- Refit the Seeger ring.



CAUTION

USE AN APPROPRIATE REST SURFACE TO AVOID DAMAGING THE COVER PAINT.

N.B.

ALWAYS REPLACE THE BEARING WITH A NEW ONE UPON REASSEMBLY.

Specific tooling

020376Y Handle for adaptors

020357Y 32 x 35 mm adaptor

020412Y 15 mm guide

Baffle roller

Plastic roller

- Check that the roller does not show signs of wear and that it turns freely.
- Remove the special clamping screws as indicated in the photograph

- Check the outer diameter of the roller does not have defects that could jeopardise belt functioning
- For refitting, place the roller with the belt containment edge on the engine crankcase side
- Tighten the wrench to the prescribed torque.

Locking torques (N*m)

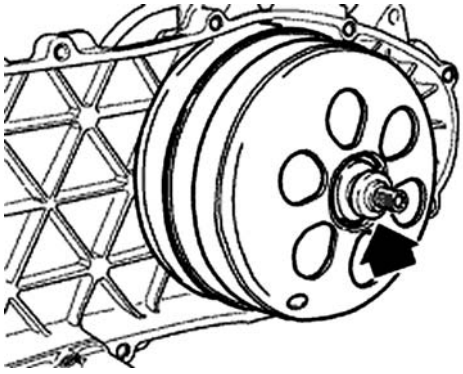
Anti-vibration roller 12 ÷ 16

Removing the driven pulley

Remove the spacer, the clutch bell and the entire driven pulley assembly.

N.B.

THE UNIT CAN ALSO BE REMOVED WITH THE DRIVE PULLEY MOUNTED.



Inspecting the clutch drum

- Check that the clutch bell is not worn or damaged.
- Measure the clutch bell inside diameter.

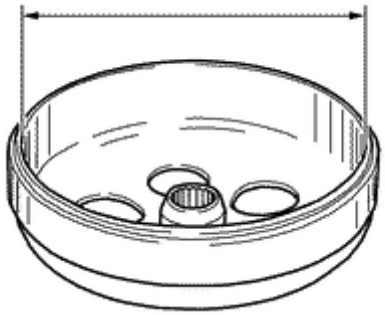
Characteristic

Max. value clutch bell

Max. value: Diameter 134.5 mm

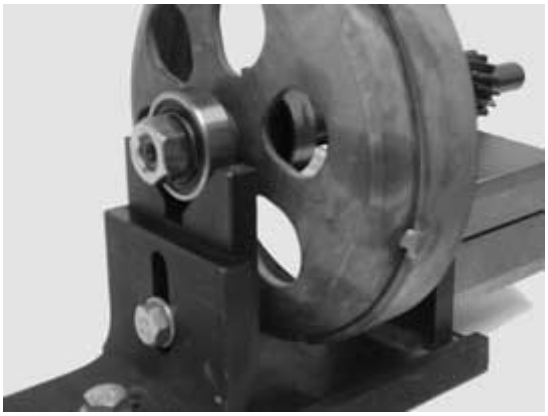
Clutch Bell Standard value

Standard value: Diameter 134 - 134.2 mm

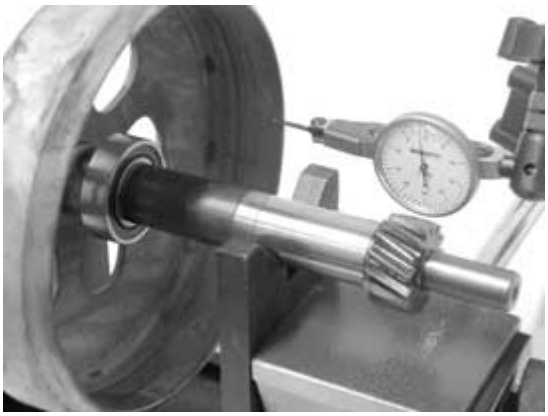


Checking the bell working surface eccentricity

- Install the bell on a driven pulley shaft using 2 bearings (inner diameter 15 and 17 mm).
- Lock using the original spacer and nut.
- Place the bell/shaft assembly on the support to check the crankshaft alignment.



- Using a feeler pin gauge and the magnetic base, measure the bell eccentricity.
- Repeat the measurement in 3 positions (Central, internal, external).
- In case of anomalies, replace the bell.



Specific tooling

020074Y Support base for alignment control of crankshaft

020335Y Magnetic support for gauge

Characteristic

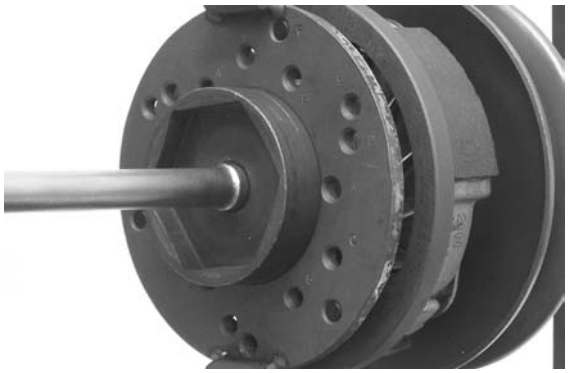
Clutch bell inspection: Limit eccentricity.

Admissible limit eccentricity: 0.15 mm

Removing the clutch

Fit the special driven pulley spring compressor tool with medium length pins in position **"C"** screwed up from the inner side of the tool.

- Introduce adapter ring n° 11 with the chamfering facing the inside of the tool.
- Fit the driven pulley assembly on the tool with the insertion of the three pins in the ventilation holes in the earth holder support.
- Make sure that the clutch is perfectly inserted into the adapter ring before proceeding to loosen/ tighten the clutch nut.
- Use the special 46x55 wrench component n°9 to remove the nut fixing the clutch in place.
- Dismantle the driven pulley components (Clutch and spring with its plastic holder)



CAUTION

THE TOOL MUST BE FIRMLY FIXED IN THE CLAMP AND THE CENTRAL SCREW MUST BE BROUGHT INTO CONTACT WITH THE TOOL. EXCESSIVE TORQUE CAN CAUSE THE APPROPRIATE TOOL TO BUCKLE.

Specific tooling

020444Y011 Adapter ring

020444Y009 Wrench 46 x 55

020444Y Driven half pulley spring compressor fit/removal tool

Inspecting the clutch

- Check the thickness of the clutch mass friction material.
- The masses must not show traces of lubricants; otherwise, check the driven pulley unit seals.

N.B.

UPON RUNNING-IN, THE MASSES MUST EXHIBIT A CENTRAL CONTACT SURFACE AND MUST NOT BE DIFFERENT FROM ONE ANOTHER.
VARIOUS CONDITIONS CAN CAUSE THE CLUTCH TO TEAR.

CAUTION

DO NOT OPEN THE MASSES USING TOOLS TO PREVENT A VARIATION IN THE RETURN SPRING LOAD.

Characteristic

Check minimum thickness

1 mm

Pin retaining collar

- Simultaneously turn and pull the collar manually to remove it.

N.B.

USE TWO SCREWDRIVERS IF YOU HAVE DIFFICULTY.

N.B.

BE CAREFUL NOT TO PUSH THE SCREW DRIVERS IN TOO FAR TO AVOID DAMAGE THAT COULD ENDANGER THE O-RING SEAL.

- Remove the four torque server pins and pull the pulley halves apart.

Removing the driven half-pulley bearing

- Check there are no signs of wear and/or noisiness; - Replace with a new one if there are.
- Remove the retaining ring using two flat blade screwdrivers.
- Support the pulley bushing adequately from the threaded side using a wooden surface.

- Using a hammer and pin, knock the ball bearing out as shown in the figure.

- Support the pulley properly using the bell as shown in the figure.

Specific tooling

001467Y035 Bell for bearing outside diameter 47 mm

- Remove the roller bearing using the modular punch.

Specific tooling

020376Y Handle for adaptors

020456Y diameter 24 mm adaptor

020363Y 20mm guide

Inspecting the driven fixed half-pulley

- Measure the pulley bushing outside diameter.
- Check that the contact surface with the belt is free from abnormal wear.
- Check the riveting.
- Check the belt contact surface planarity.

Characteristic

Minimum pulley half diameter

Minimum admissible diameter 40.96 mm

Standard pulley half diameter

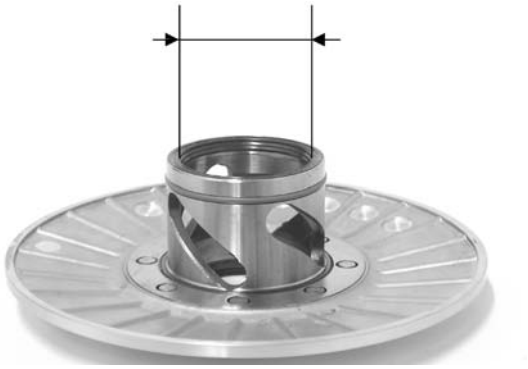
Standard diameter 40.985 mm

Wear limit

0.3 mm

Inspecting the driven sliding half-pulley

- Remove the two internal grommets and the two O-rings.
- Measure the inner diameter of the mobile half-pulley bushing.
- Check the contact surface with the belt to make sure there are no flaws.
- Check the riveted joints are functional.
- Check the evenness of the belt contact surface.



MOVING DRIVEN PULLEY HALF DIMENSIONS

Specification	Desc./Quantity
Wear limit	0.3 mm
Standard diameter	Diameter 41.000 - 41.035 mm
Maximum allowable diameter	41.08 mm

Refitting the driven half-pulley bearing

- Support the pulley bushing adequately from the

threaded side using a wooden surface.

- Fit a new roller sleeve as in the figure.
- For the fitting of the new ball bearing, follow the example in the picture using a modular punch.

Fit the retention ring

N.B.

N.B. Fit the ball bearing with the visible shield

Specific tooling

020376Y Handle for adaptors

020375Y Adapter 28 x 30 mm

020424Y Punch for fitting driven pulley roller casing

Refitting the driven pulley

- Insert the new oil guards and O-rings on the moving pulley half.
- Lightly grease the O-rings O-R (A) shown in the figure.
- Fit the pulley half over the bushing using the appropriate tool

Check that the pins are not worn and proceed with the refitting in the relative hollows.-

- Refit the torque server closure collar.
- Using a curved-spout grease gun, lubricate the driven pulley assembly with approximately 6 gr of grease. Apply the grease through one of the holes in the bushing until it comes out through the hole on the opposite side. This operation is necessary to avoid the presence of grease beyond the O-rings.

N.B.

THE TORQUE SERVER GREASING OPERATION CAN BE DONE BOTH WITH BEARINGS FITTED AND WHEN THEY ARE BEING REPLACED; UNDERTAKING THE OPERATION WHEN THE BEARINGS ARE BEING SERVICED MIGHT BE EASIER.

Specific tooling

020263Y Driven pulley assembly sheath

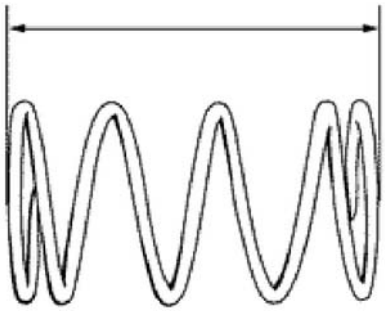
Recommended products

TUTELA MRM 2 Grease for the rotating ring of the tone wheel

Molybdenum disulphide and lithium soap grease

Inspecting the clutch spring

- Measure the free length of the mobile driven half-pulley spring.



Characteristic

Standard length

123 mm

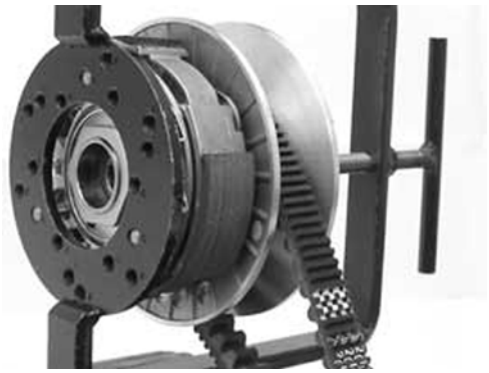
Acceptable limit after use:

118 mm

Refitting the clutch

- Support the driven pulley spring compressor specific tool with the control screw in vertical axis.
- Arrange the tool with the medium length pins screwed in position «**C**» on the inside.
- Introduce the adapter ring n° 11 with the chamfering facing upwards.
- Insert the clutch on the adapter ring.
- Lubricate the end of the spring that abuts against the servo-system closing collar.
- Insert the spring with relevant plastic support in contact with the clutch.

- Insert the driving belt into the pulley unit according to their direction of rotation.
- Insert the pulley unit with the belt into the tool.
- Slightly pre-load the spring.
- Make sure that the clutch is perfectly inserted into the adapter ring before proceeding to tighten the clutch nut.
- Place the tool into the vice with the control screw in horizontal axis.
- Fully pre-load the spring.
- Apply the clutch fixing nut and tighten it at the prescribed torque using the specific wrench 46x55.
- Loosen the tool clamp and insert the belt according to its direction of rotation.
- Lock the driven pulley again using the specific tool.
- Pre-load the clutch contrast spring by turning and pulling at the same time and place the belt in the minimum rolling diameter position.
- Remove the driven pulley /belt assembly from the tool.



N.B.

DURING THE SPRING PRE-LOADING PHASE, BE CAREFUL NOT TO DAMAGE THE PLASTIC SPRING STOP AND THE BUSHING THREADING.

N.B.

FOR DESIGN REASONS, THE NUT IS SLIGHTLY ASYMMETRIC; THE FLATTEST SURFACE SHOULD BE MOUNTED IN CONTACT WITH THE CLUTCH.

Specific tooling

020444Y Driven half pulley spring compressor fit/removal tool

020444Y011 Adapter ring

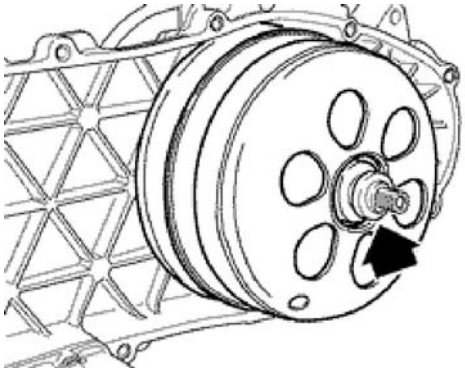
020444Y009 Wrench 46 x 55

Locking torques (N*m)

Nut locking clutch assembly on pulley 55 ÷ 60 Nm

Refitting the driven pulley

- Reinstall the clutch bell and the spacer.



Drive-belt

- Ensure the drive-belt is not damaged.
- Check the drive-belt width.

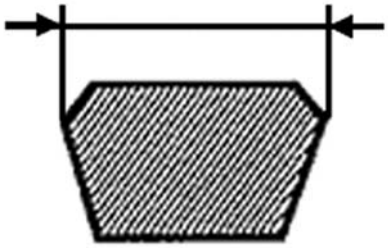
Characteristic

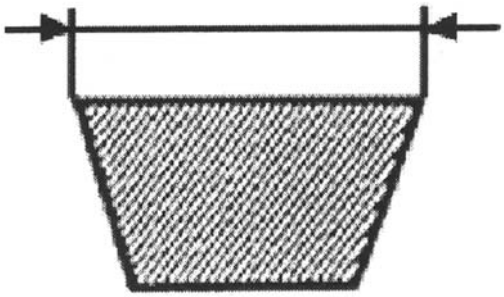
Driving belt - standard width

21,3 ± 0,2 mm

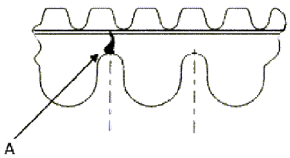
Driving belt - minimum width

19,5 mm





During the wear check to be performed according to the scheduled maintenance in the 6,000 Km inspection, in the 18,000 Km inspection, etc., it is advisable to check that the tooth groove bottom is

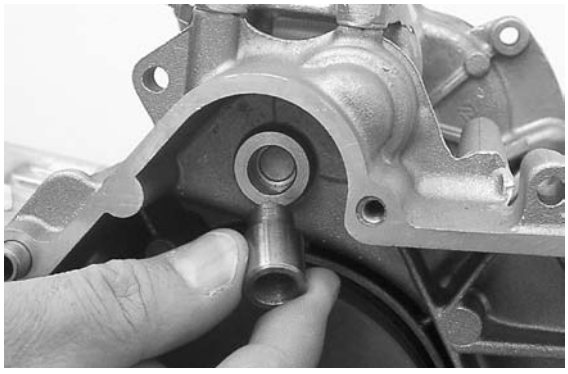


free from deformations and cracks (see figure). In case of cracks, the belt must be replaced. «**A**»: The tooth groove bottom must be free from deformations and cracks; if not, replace the belt.

Removing the driving pulley

- Turn the crankshaft until the ropes of the pulley are on a horizontal axis

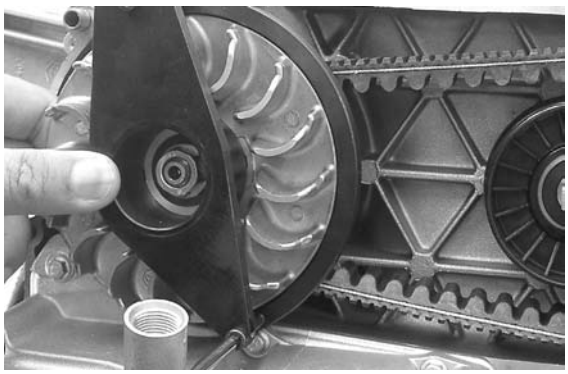
- Insert the adaptor sleeve of the appropriate tool in the hole shown in the photograph



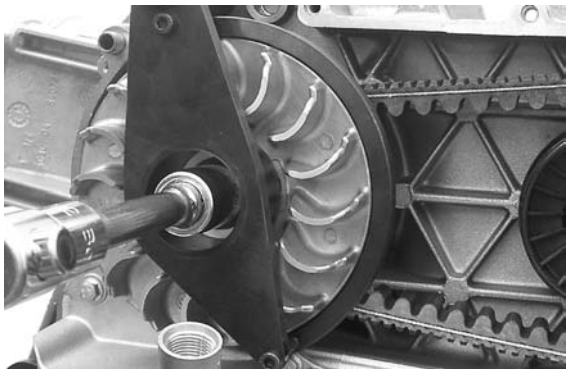
- Insert the tool in the hollows and apply the retention ring
- Bring in the ring's clamping screws while keeping the tool to support the pulley

Specific tooling

020626Y Drive pulley stop wrench

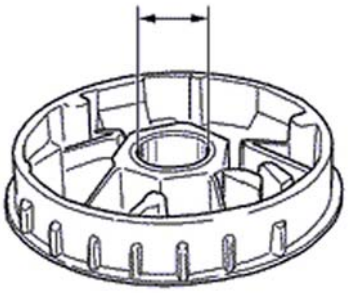


- Remove the fixing nut and the washer
- Remove the stationary drive pulley half.



Inspecting the rollers case

- Ensure the internal bearing, shown in the figure, is not abnormally worn and measure the internal diameter.
- Measure the external diameter of the pulley sliding bushing, shown in the figure.
- Ensure rollers are not damaged or worn.
- Ensure the roller plate shoes are not damaged.
- Check the wear of the roller housings and of the belt contact surfaces on both half-pulleys.
- Ensure the fixed driving pulley exhibits no abnormal wear on the grooved profile and on the belt contact surface.
- Ensure the O-ring is not deformed.



CAUTION

DO NOT LUBRICATE OR CLEAN SINTERED BUSHINGS

Characteristic

Mobile driving half-pulley bushing: Standard diameter

26.000 - 26.021 mm

Mobile driving half-pulley bushing: Maximum allowable diameter

26.12 mm

Sliding bushing: Standard diameter

25.959 - 25.98 mm

sliding bushing: Minimum admissible diamet-

er

25.95 mm

Roller: Standard diameter

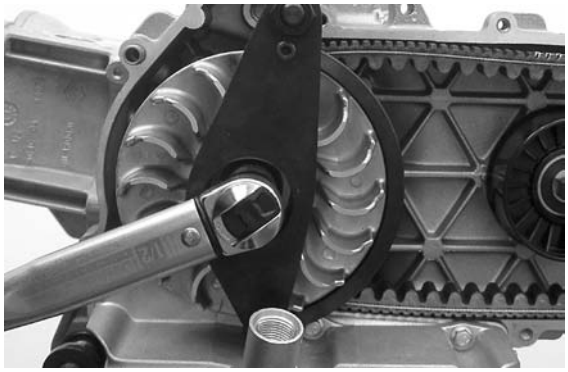
Diameter 20.5 - 20.7 mm

Roller: Minimum admissible diameter

Ø 20 mm

Refitting the driving pulley

- Fit the steel shim in contact with the bushing and the stationary drive pulley.
- Install the appropriate tool as described in the removal phase.
-Tighten the nut with washer to the prescribed torque.



Specific tooling

020626Y Drive pulley stop wrench

Locking torques (N*m)

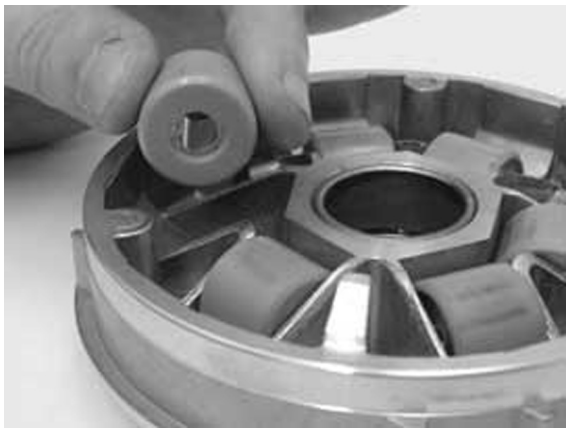
drive pulley nut 75 ÷ 83

- Pre-assemble the moving pulley half with the roller contrast plate by putting the rollers in their housings with the larger support surface touching the pulley according to the direction of rotation.
- Check that the roller contact plate does not have

flaws and is not damaged on the grooved edge.

- Mount the complete bushing unit on the driving shaft.

- Fit the driven pulley/Clutch/belt assembly on the engine.



Refitting the transmission cover

- Check the presence of the 2 centring dowels and the correct installation of the sealing gasket for the oil sump on the transmission cover.

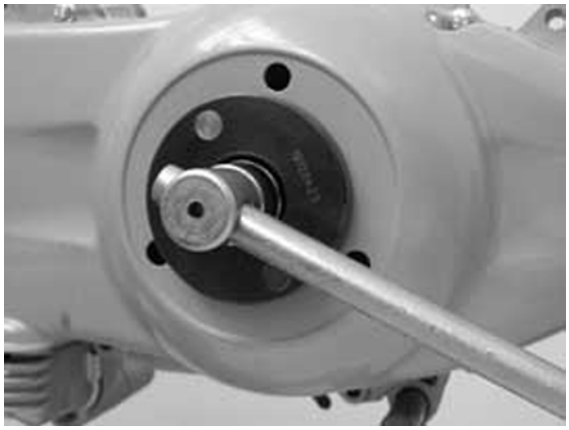
- Replace the cover tightening the 10 screws to the prescribed torque.

- Replace the oil loading cap/bar.

- Replace the steel washer and the driven pulley nut.

- Tighten the nut to the prescribed torque using the lock wrench and the torque wrench tools.

- Replace the plastic cover.



Specific tooling

020423Y driven pulley stop wrench

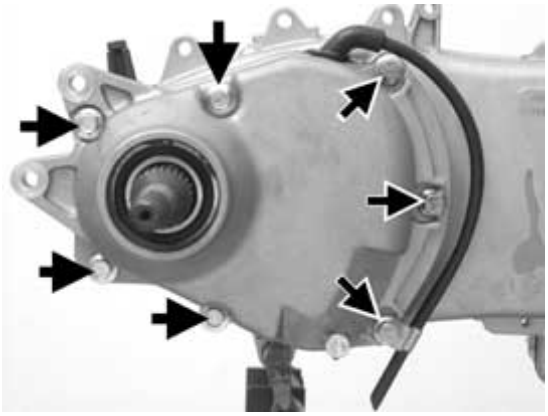
Locking torques (N*m)

Transmission cover screws 11 ÷ 13 Driven pulley shaft nut 54 ÷ 60

End gear

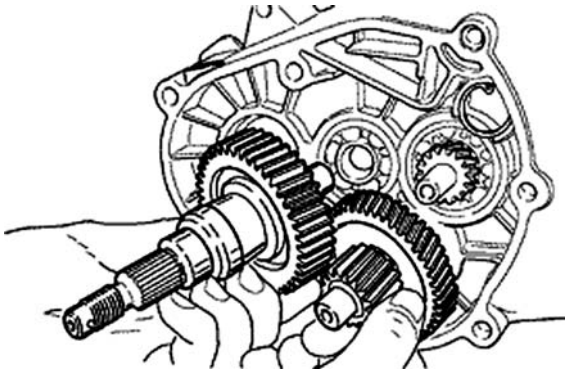
Removing the hub cover

- Empty the rear hub through the oil drainage tap.
- Remove the 7 flanged screws indicated in the figure.
- Remove the hub cover and its gasket.



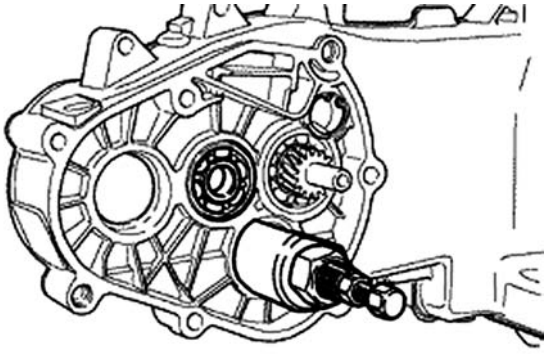
Removing the wheel axle

- Remove the wheel axle with gear.
- Remove the intermediate gear.



Removing the hub bearings

- Check the state of the bearings being examined (wear, clearance and noisiness). If faults are detected, do the following.
- Use the bearing extractor, available as an appropriate tool, to remove the three 15 mm bearings (two in the crankcase and one in the hub cover).



Specific tooling

001467Y013 Extraction pliers for 15 mm diameter bearings

Removing the wheel axle bearings

- Take out the clip on the outside of the gearbox cover.
- Support the hub cover and expel the bearing.

By means of the appropriate tools, remove the oil guard as in the figure.

Specific tooling

020376Y Handle for adaptors

020477Y Adapter 37 mm

020483Y 30 mm guide

020359Y 42 x 47 mm adaptor

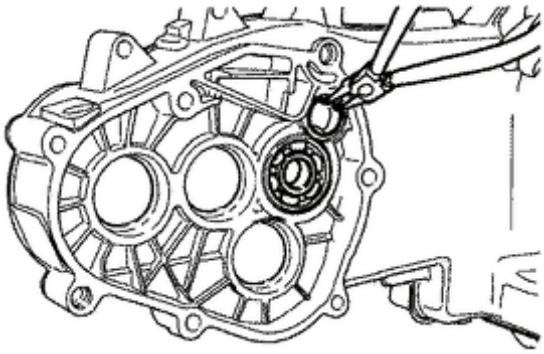
020489Y Hub cover support stud bolt set

Removing the driven pulley shaft bearing

- As you need to remove the driven pulley shaft, its bearing and oil guard, remove the transmission cover as described above.
- Extract the driven pulley shaft from its bearing.
- Remove the oil guard using a screwdriver, work-

ing from inside the bearing and being careful not to damage the housing, make it come out of the belt transmission side.

- Remove the Seeger ring shown in the figure Remove the driven pulley shaft bearing using the modular punch.



Specific tooling

020376Y Handle for adaptors

020375Y Adapter 28 x 30 mm

020363Y 20mm guide

Inspecting the hub shaft

- Check that the three shafts exhibit no wear or deformation on the toothed surfaces, at the bearing housings and at the oil guards.
- In case of faults, replace the damaged components.

Inspecting the hub cover

- Check that the fitting surface is not dented or distorted.
- Check the bearing bearings.
- In case of anomalies, replace the damaged components.

Refitting the wheel axle bearing

- Support the hub cover on a wooden surface.
- Heat the cover crankcase with special heat gun.
- Fit the wheel shaft bearing with a modular punch

as shown in the figure.

- Fit the Seeger ring.
- Fit the oil guard with seal lip towards the inside of the hub and place it flush with the internal surface by means of the appropriate tool used from the 52 mm side.

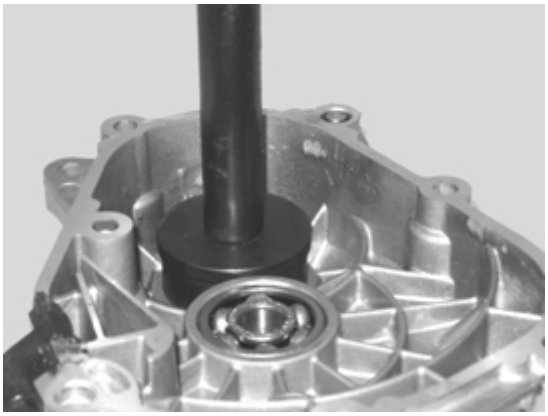
The 52 mm side of the adapter must be turned towards the bearing.

Specific tooling

020376Y Handle for adaptors

020360Y 52 x 55 mm adaptor

020483Y 30 mm guide

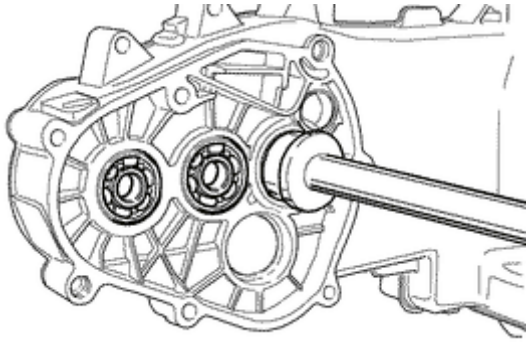


Refitting the hub cover bearings

For the fitting of the hub box bearings the engine crankcase and the cover must be heated with the special heat gun.

- The three 15 mm bearings must be fitted using the appropriate tools.

The 42 mm side of the adapter must be turned towards the bearing.



Specific tooling

020150Y Air heater support

020151Y Air heater

020376Y Handle for adaptors

020359Y 42 x 47 mm adaptor

020412Y 15 mm guide

N.B.

Use the stud bolt set in the fitting of the bearing on the cover to support said cover.

- Refit the driven pulley shaft bearing with a modular punch as shown in the figure.

N.B.

If the bearing has an asymmetrical ball retention cage, place it with the balls visible from the inside side of the hub.

Specific tooling

020376Y Handle for adaptors

020359Y 42 x 47 mm adaptor

020363Y 20mm guide

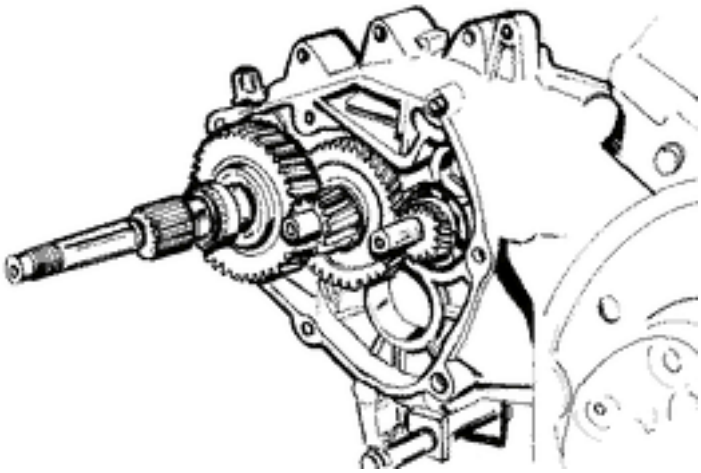
N.B.

When fitting the bearings on the engine crankcase, this should, as far as possible, be supported on a surface to allow the bearings to be driven vertically.

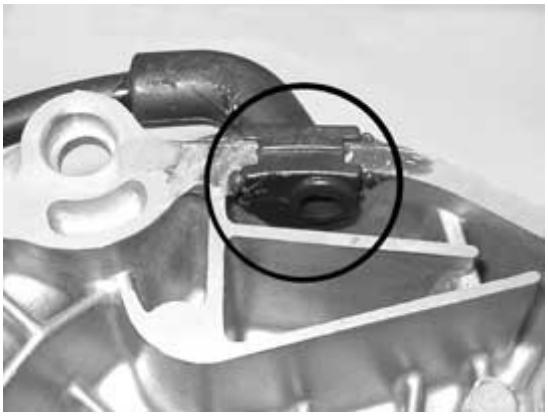
- Refit the Seeger ring with the opening facing the bearing and fit a new oil guard flush with the crankcase from the pulley side.

Refitting the hub bearings

- Install the three shafts in the engine crankcase as shown in the figure.



Refitting the ub cover



- Install a new gasket with the centring dowels.
- Seal the vent pipe gasket using black silicone sealant.
- Install the cover checking the correct position of the vent pipe.
- Place the 3 shorter screws that can be recognised by the different colour as shown in the figure.
- Fix the vent pipe support bracket using the lower short screw.
- Install the remaining 4 screws and tighten the 7 screws at the prescribed torque.

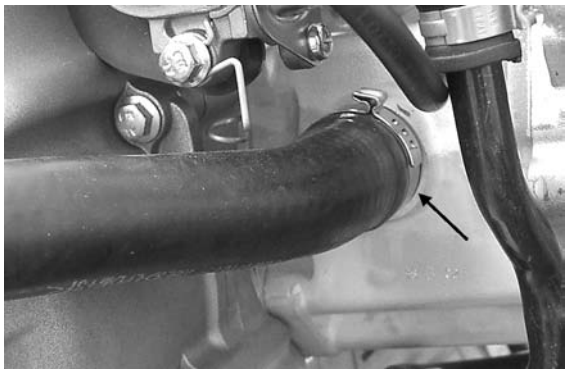
Locking torques (N*m)

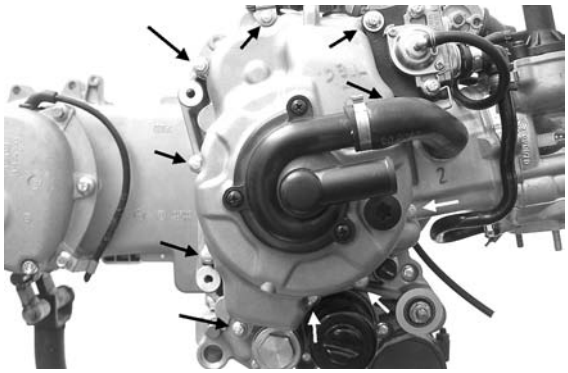
Hub cover screws 24 - 27

Flywheel cover

Removing the hub cover

- Remove the clip fixing the hose to the cylinder.
- Remove the ten fixings
- Remove the flywheel cover.





Removing the stator

- Remove the two pickup screws and the screw holding the wiring support and the three stator

clamping screws shown in the figure.

- Remove the stator and its wiring.

Refitting the stator

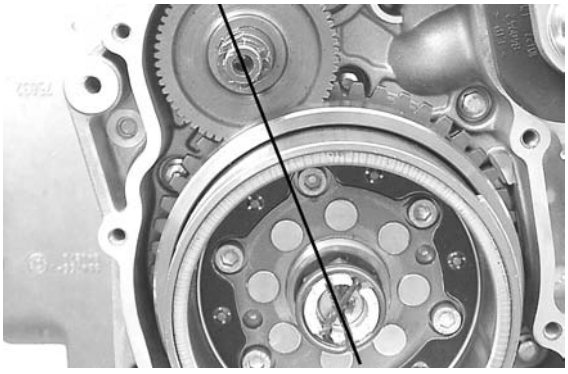
- Refit the stator and flywheel carrying out the removal procedure in reverse, tightening the studs to the prescribed torque.

Locking torques (N*m)

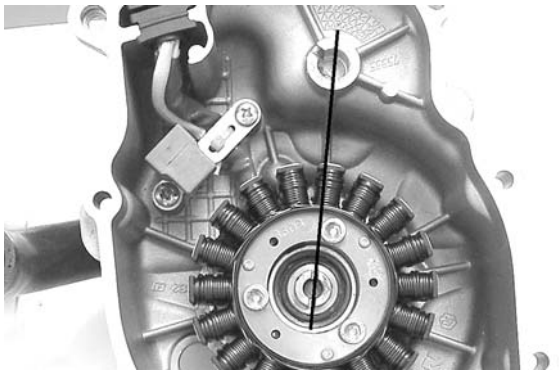
Stator assembly screws (°) 3 ÷ 4

Refitting the flywheel cover

- Position the spline clip on the crankshaft and orient the end as shown in the figure.



- Orient the water pump shaft with reference to the transmission gear seat as shown in the photo.



- Refit the cover over the engine and tighten the screws to the prescribed torque.
- Carry out the steps in the reverse order from the dismantling procedure.

CAUTION

TAKE CARE TO CORRECTLY POSITION THE FLYWHEEL CONNECTOR. MAKE SURE THE CENTRING DOWELS ARE PRESENT.

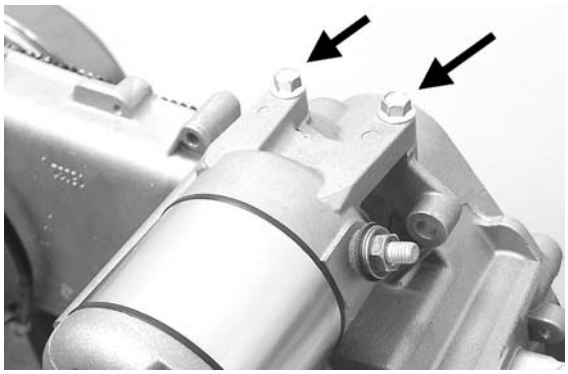
Locking torques (N*m)

Flywheel cover screws 11 - 13

Flywheel and starting

Removing the starter motor

- Remove the two screws indicated in the figure.
- Take the starter motor out of its seat



Removing the flywheel magneto

- Hold the flywheel using the adjustable spanner.
- Remove the lock-nut.
- Extract the flywheel.

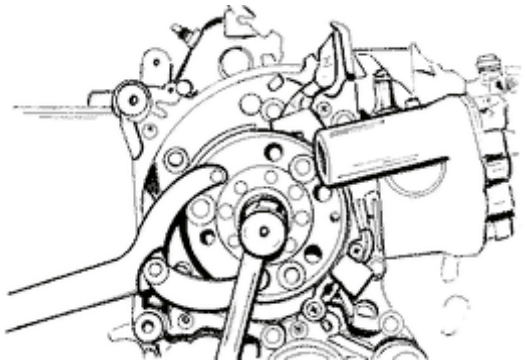
CAUTION

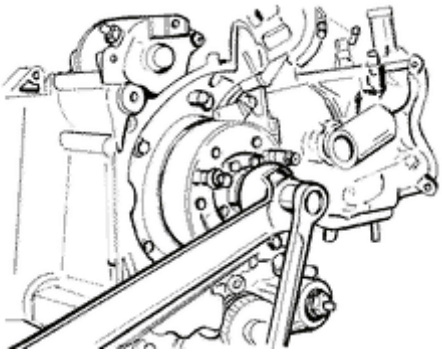
USING A DIFFERENT WRENCH COULD DAMAGE THE STATOR COILS.

Specific tooling

020565Y Flywheel compasses tool

008564Y Flywheel extractor

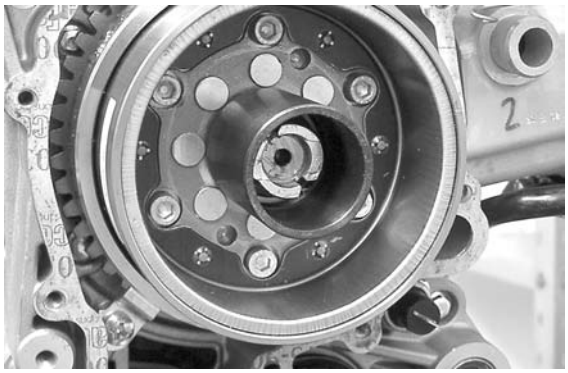




- Remove the water pump shaft and crankshaft spline clip

- Line up the two holes in the flywheel as shown in the photo

- Screw in the guide bushing that is part of the special flywheel stop tool on the flywheel as shown in the photo.



- Insert the special flywheel stop tool on the flywheel as shown in the photo

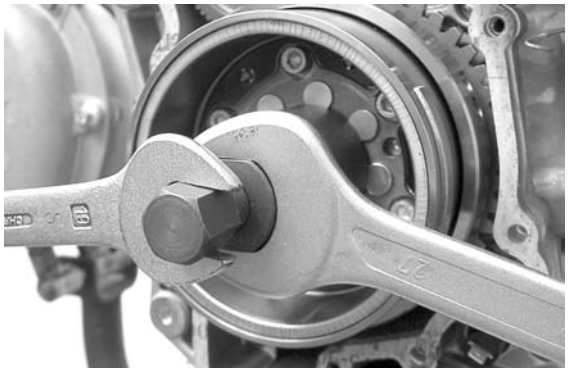
Specific tooling

020627Y Flywheel stop wrench

- Remove the flywheel nut with its washer
- Tighten the flywheel nut by three or four threads so that the flywheel does not fall accidentally on extraction
- Screw the extractor onto the flywheel and extract it as shown in the photograph

Specific tooling

020467Y Flywheel extractor



Inspecting the flywheel components

- Check the integrity of the internal plastic parts of the flywheel and the pickup control plate.

Refitting the free wheel

- Check that the freewheel contact surfaces are in good condition.
- Carefully clean the freewheel to remove any residues of LOCTITE.
- Degrease the threading of the holes on the freewheel and the fastening screws.
- Apply the recommended product to the ends of the screws.

Recommended products

Loctite 243 Medium threadbrake

Medium Loctite threadbrake 243

- Install the freewheel on the flywheel, with the rectified part in contact with the flywheel, that is with visible wheel snap ring.
- Tighten the 6 fastening screws in a crossed sequence to the prescribed torque.

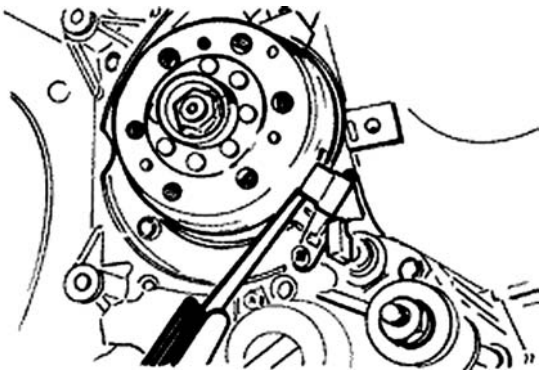
Locking torques (N*m)

freewheel mounting screws on the flywheel 13 - 15

- Lubricate the freewheel "rollers"

Refitting the flywheel magneto

- Install the flywheel being careful to the proper introduction of the key.
- Tighten the flywheel nut at the prescribed torque.
- Check that the Pick-Up air gap ranges between 0.34 - 0.76 mm.
- The Pick-Up assembly requires no gap adjustment.
- Different values are caused by deformations of the Pick-Up support.



N.B.

A VARIATION IN THE GAP DISTANCE CHANGES THE MINIMUM DELIVERY SPEED OF THE IGNITION

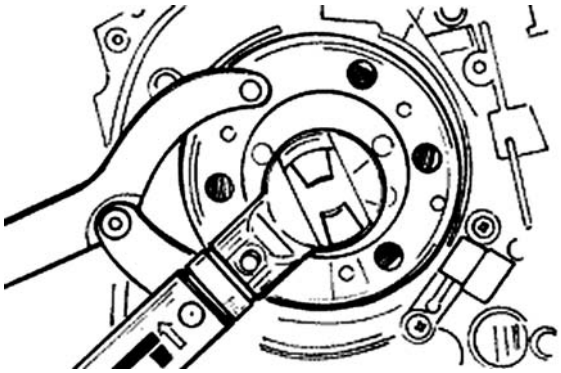
SYSTEM.

Specific tooling

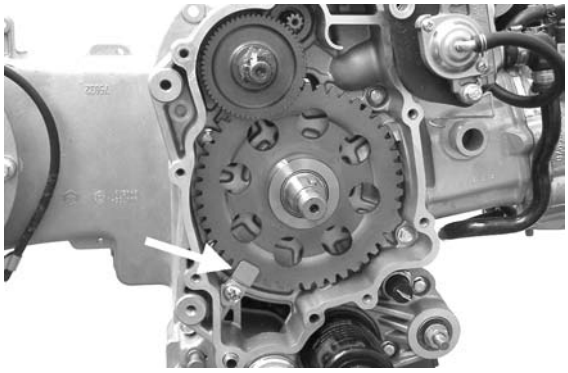
020565Y Flywheel compasses tool

Locking torques (N*m)

Flywheel nut 54 ÷ 60



- Remove the freewheel retaining plate indicated in the photograph
- Remove the transmission gear and the free-wheel



- Insert the freewheel on the flywheel as shown in the photo
- Then refit the flywheel with freewheel and trans-mission gear

- Using the special flywheel stop tool, tighten up the flywheel fixing nut to the prescribed torque
-Refit the retention plate

Specific tooling

020627Y Flywheel stop wrench

Locking torques (N*m)

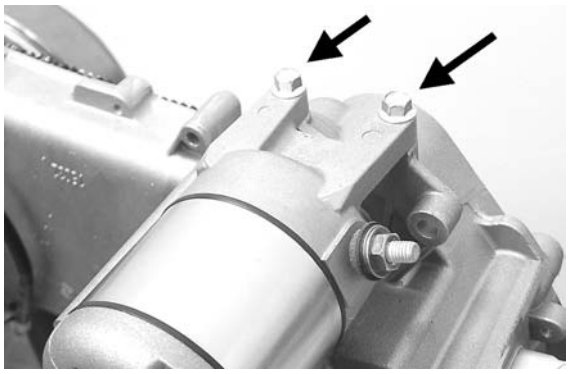
Flywheel nut 94 ÷ 102

Refitting the starter motor

- Fit a new O-ring on the starter motor and lubricate it.
- Install the starter on the engine crankcase, tightening the two screws to the prescribed torque.

Locking torques (N*m)

Starter screws 11 - 13



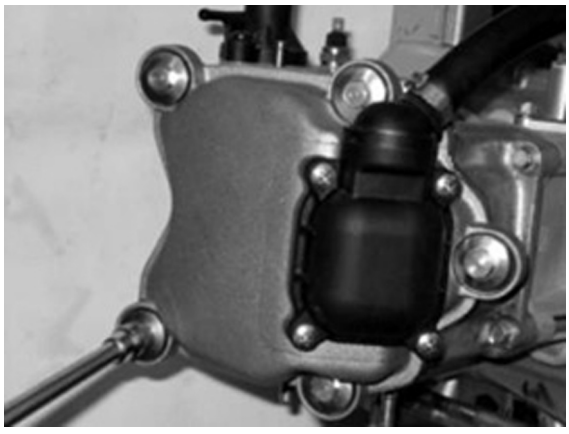
Cylinder assy. and timing system

Removing the intake manifold

- Remove the flywheel cover as described in the Flywheel cover chapter.
- Loosen the 3 screws and remove the intake manifold.

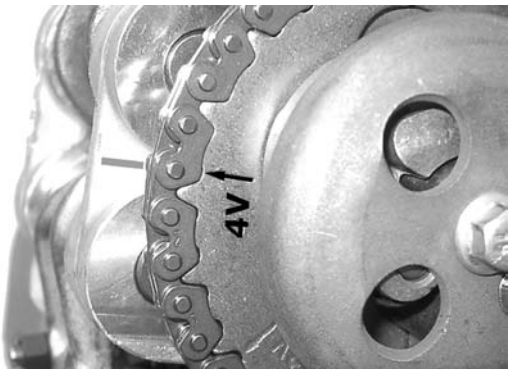
Removing the rocker-arms cover

- Remove the 5 screws indicated in the figure.

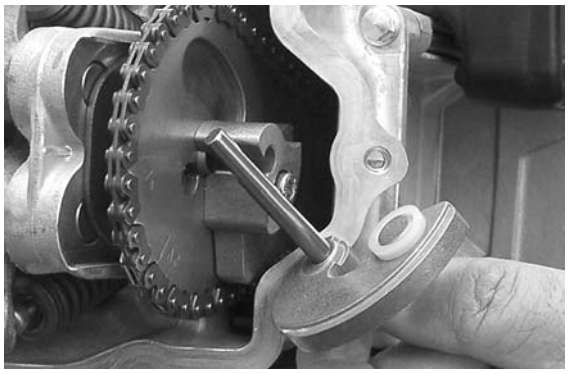


Removing the timing system drive

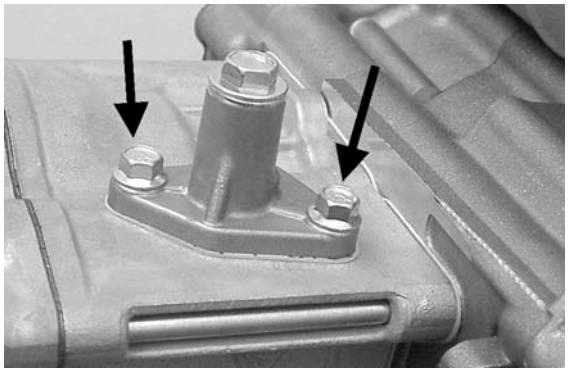
- Remove the parts listed below first: transmission cover, drive pulley with belt, oil sump with spring and by-pass piston, oil pump pulley cover, O-ring on the crankshaft and the sprocket wheel separation washer.
- Remove the tappet cover.
- Remove the central screw fastener and the automatic valve-lifter retaining cover, as shown in the figure.



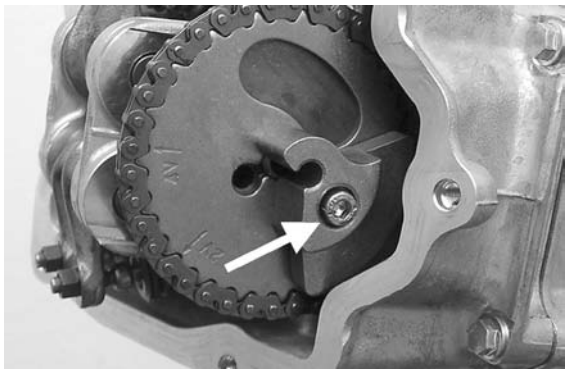
- Remove the return spring of the automatic valve lifter assembly and the automatic valve lifter assembly and its end of stroke washer.



- Loosen the central screw on the tensioner first.
- Remove the two fixings shown in the figure.
- Remove the tensioner with its gasket.

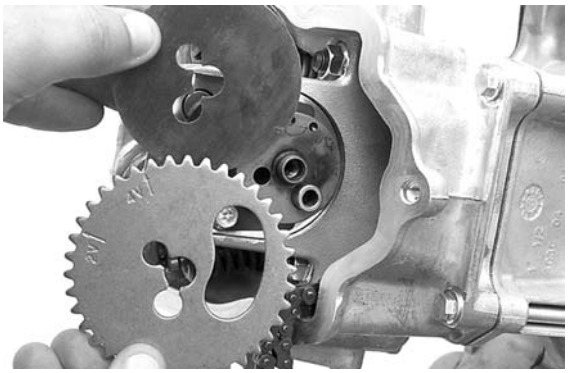


- Remove the internal hex screw and the counterweight shown in the figure.



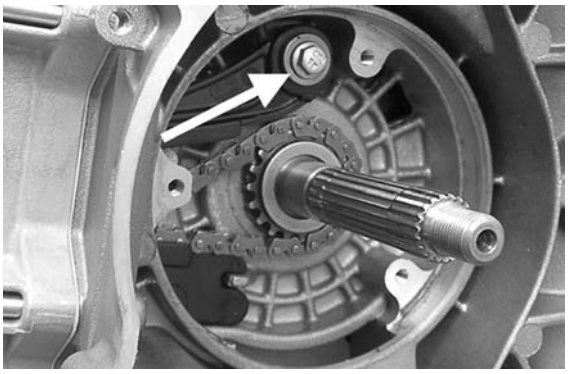
- Remove the camshaft command pulley and its

washer.



- Remove the command sprocket wheel and the timing chain.
- Remove the screws indicated in the figure, the spacer bar and the tensioner pad.

The chain tensioning pad must be removed from the transmission side. As regards the lower chain guide pad, it may only be removed after the head has been removed.

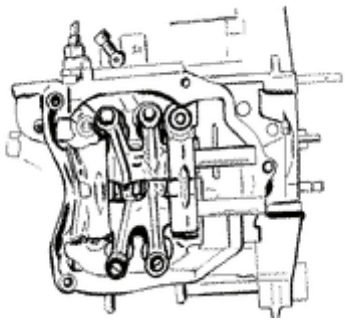


N.B.

IT IS ADVISABLE TO MARK THE CHAIN IN ORDER TO ENSURE THAT THE INITIAL DIRECTION OF ROTATION IS MAINTAINED.

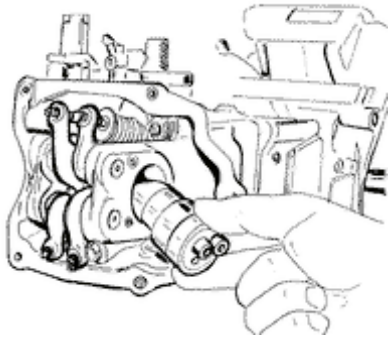
Removing the cam shaft

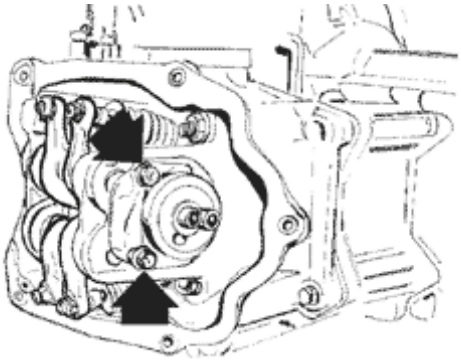
- Remove the two screws and the cam shaft retainer shown in the diagram.
- Remove the cam shaft.
- Remove the pins and the rocker arms from the flywheel side holes.



N.B.

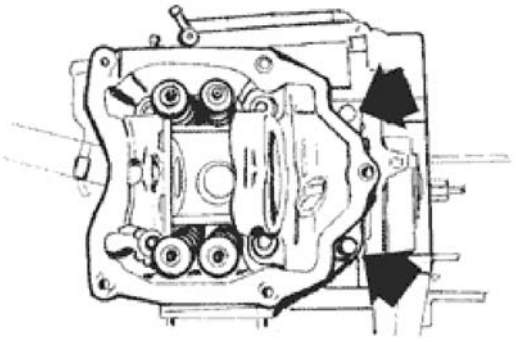
IN CASE OF NEED, THE HEAD MAY BE REMOVED WITH THE CAMSHAFT, PINS, ROCKERS AND FIXING BRACKET. THE HEAD CAN ALSO BE REMOVED WITHOUT REMOVING THE CHAIN AND THE DRIVING SHAFT CHAIN TIGHTENER.





Removing the cylinder head

- Remove the spark plug.
- Remove the 2 side fixings shown in the figure.
- Loosen the 4 head-cylinder fastening nuts in two or three stages and in criss-cross fashion.
- Remove the head, the two centring dowels and the gasket.



N.B.

IN CASE OF NEED, THE HEAD MAY BE REMOVED WITH THE CAMSHAFT, PINS, ROCKERS AND FIXING BRACKET. THE HEAD CAN ALSO BE REMOVED WITHOUT REMOVING THE CHAIN AND THE DRIVING SHAFT CHAIN TIGHTENER.

Removing the valves

- Using the specific tool with adapter, remove half-cones, plates, springs and valves.
- Remove the oil guards by the specific tool.
- Remove the lower spring supports.

CAUTION

Replace the valves in such a way as to recognise their original position on the head.

Specific tooling

020382Y011 adapter for valve removal tool

020382Y Tool for removing valve cotters equipped with part 012

020306Y Punch for fitting valve sealing ring

Removing the cylinder - piston assy.

Cylinder and piston removal

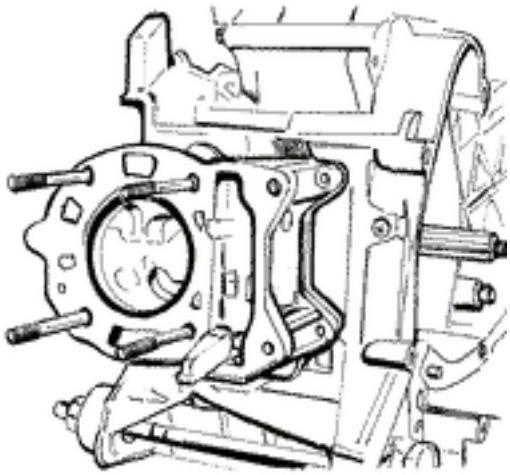
- Remove the chain guide sliding block.
- Extract the cylinder.
- Remove the cylinder base gasket.
- Remove the 2 lock rings, the pin and the piston.
- Remove the piston sealing rings.

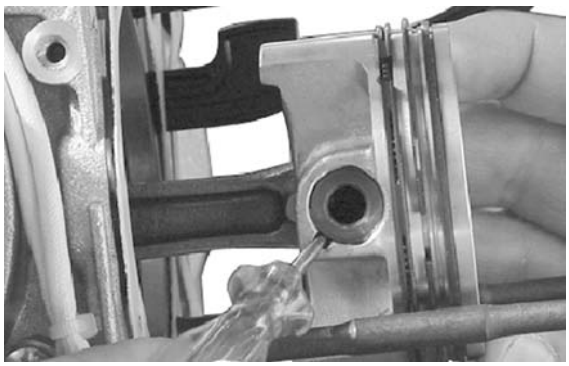
CAUTION

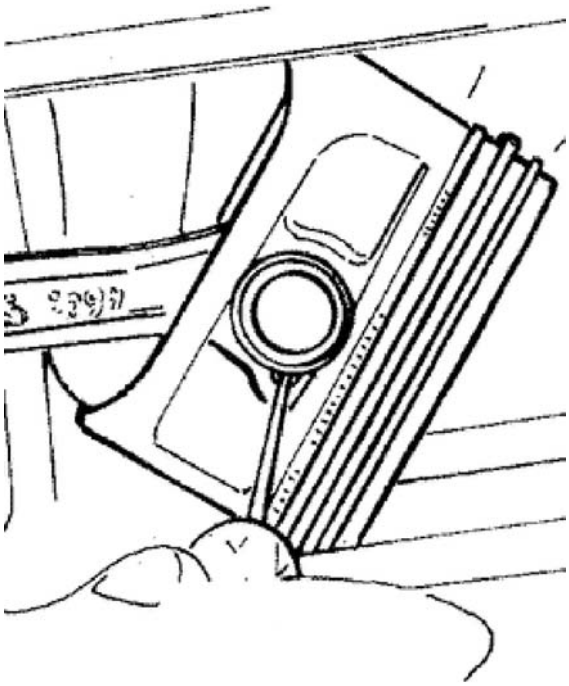
TO AVOID DAMAGING THE PISTON, SUPPORT IT WHILE REMOVING THE CYLINDER.

N.B.

BE CAREFUL NOT TO DAMAGE THE SEALING RINGS DURING REMOVAL.





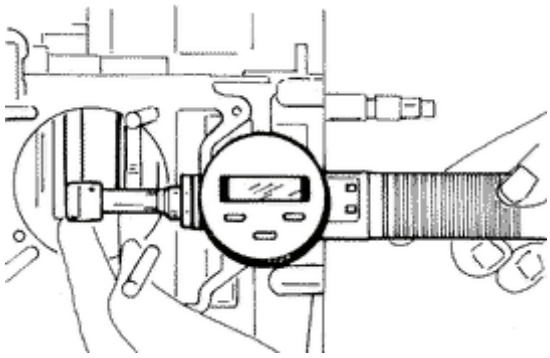


Inspecting the small end

- Measure the internal diameter of the rod small end using an internal micrometer.

N.B.

If the diameter of the rod small end exceeds the standard diameter, shows signs of wear or overheating, replace the crankshaft.



Characteristic

Checking the connecting rod small end: Maximum diameter

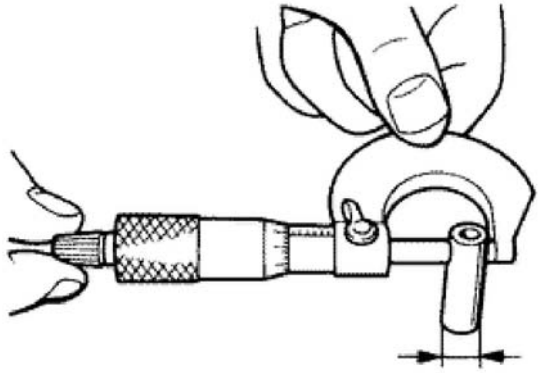
15.030 mm

Checking the connecting rod small end: Standard diameter

15 +0.015+0.025mm

Inspecting the wrist pin

- Measure the outer diameter of the gudgeon pin.
- Calculate the rod small end - gudgeon pin coupling clearance.



Characteristic

Pin diameter: Standard clearance

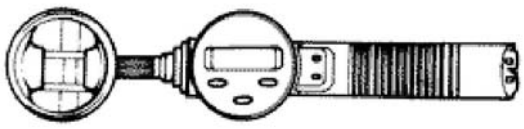
0.015 ÷ 0.029 mm

Pin diameter Standard diameter

14.996 - 15.000 mm

Inspecting the piston

- Measure the diameter of the wrist pin seat on the piston.
- Calculate the piston pin coupling clearance.
- Measure the outside diameter of the piston, perpendicular to the gudgeon pin axis.
- Take the measurement at 5 mm from the base in the position shown in the figure.
- Carefully clean the seal housings.
- Measure the coupling clearance between the seal rings and the grooves using suitable sensors, as shown in the diagram.



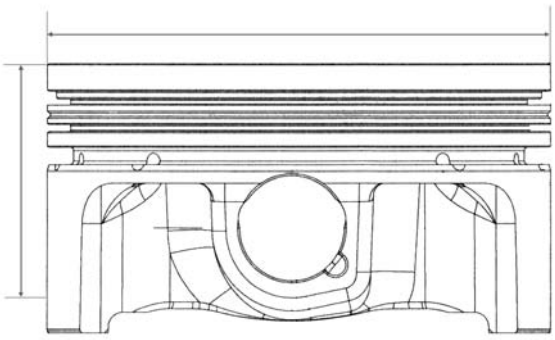
- If the clearances exceed the limits specified in the table below, the piston should be replaced by a new one.

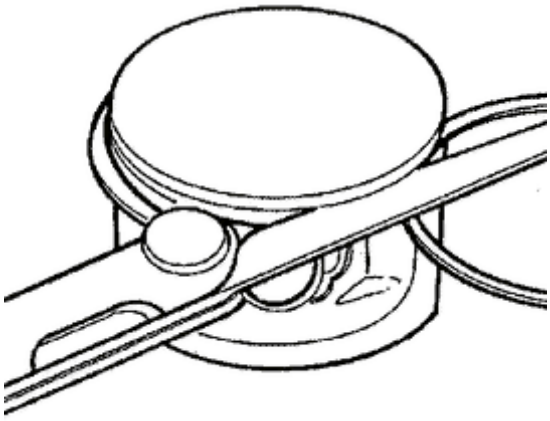
N.B.

MEASURE THE CLEARANCE BY INSERTING THE BLADE OF THE THICKNESS GAUGE FROM THE SIDE OF THE 2ND PISTON RING.

N.B.

THE PIN HOUSINGS HAVE TWO LUBRICATION CHANNELS. FOR THIS REASON MEASUREMENT OF THE DIAMETER MUST BE CARRIED OUT ACCORDING TO THE AXIS OF THE PISTON.





Characteristic

Wrist pin seat on the piston: Standard diameter

15.001 ÷ 15.006 mm

Diameter of the wrist pin seat on the piston: Standard clearance

0.001 ÷ 0.010 mm

piston diameter

71.953 - 71.981 mm

Fitting clearance

Top piston ring - standard coupling clearance 0.015 - 0.06 mm **Top piston ring - maximum clearance allowed after use** 0.07 mm **Middle piston ring - standard coupling clearance** 0.015 - 0.06 mm **Middle piston ring - maximum clearance allowed after use** 0.07 mm **scraper ring- standard coupling clearance** 0.015 - 0.06 mm **scraper ring - maximum clearance allowed after use** 0.07 mm

Inspecting the cylinder

- Using a bore gauge, measure the internal diameter of the cylinder following the directions given in the figure and at three different heights.
- Check that the plane of coupling with the head does not show wear or deformations.
- The pistons and cylinders are classified with cat-

egories depending on the diameters. The coupling is carried out matched (A-A, B-B, C-C, D-D).

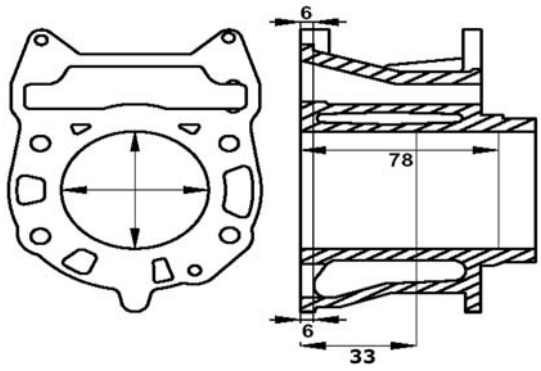
Characteristic

cylinder: standard diameter

71.990 - 72.018 mm (at 33 mm)

Maximum allowable runout:

0.05 mm



Removing the piston

- Refit piston and wrist pin on connecting rod with the arrow stamped on the piston crown pointing towards the exhaust.
- Position the wrist pin spring clip on the special tool.
- With the opening in the position shown on the tool.

S = Left

D = Right

- Correctly position the clip using the drift.
- Install the clip using the drift as shown in the figure.

N.B.

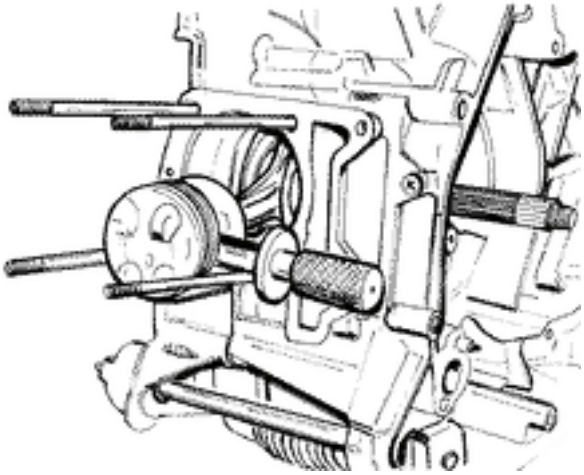
THE TOOL FOR INSTALLING THE LOCKING RINGS MUST BE USED MANUALLY.

CAUTION

USING A HAMMER MAY DAMAGE THE LOCK HOUSINGS

Specific tooling

020454Y Tool for fitting piston pin stops (200 - 250)

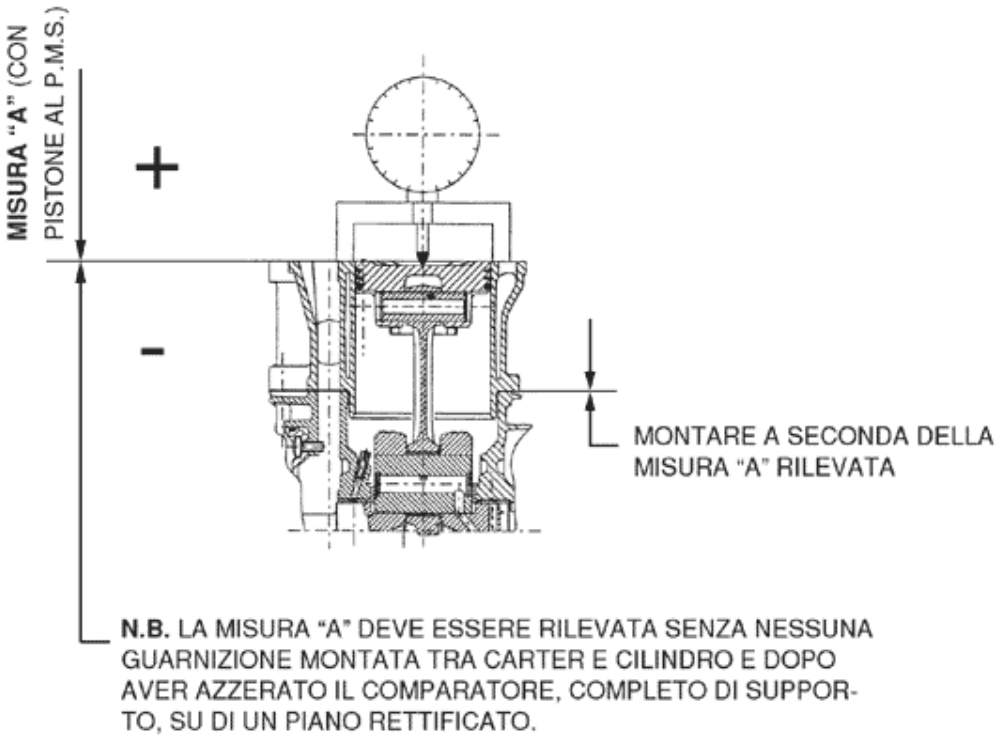


Choosing the gasket

Characteristic

Compression ratio

10.5 - 11.5 : 1


MISURA "A" (CON PISTONE AL P.M.S.)
+
-
MONTARE A SECONDA DELLA MISURA "A" RILEVATA
N.B. LA MISURA "A" DEVE ESSERE RILEVATA SENZA NESSUNA GUARNIZIONE MONTATA TRA CARTER E CILINDRO E DOPO AVER AZZERATO IL COMPARATORE, COMPLETO DI SUPPORTO, SU DI UN PIANO RETTIFICATO.

N.B.

MEASUREMENT "A" TO BE TAKEN IS A VALUE OF PISTON RE-ENTRY, IT INDICATES BY HOW MUCH THE PLANE FORMED BY THE PISTON CROWN FALLS BELOW THE PLANE FORMED BY THE TOP OF THE CYLINDER. THE FURTHER THE PISTON FALLS INSIDE THE CYLINDER, THE LESS THE BASE GASKET IS TO BE APPLIED (TO RECOVER THE COMPRESSION RATIO) AND VICEVERSA.

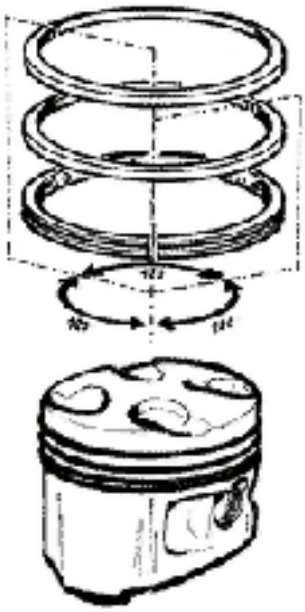
SHIMMING

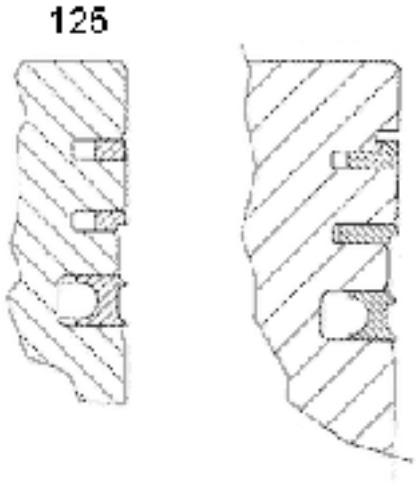
Name	Measure A	Thickness
Shimming	3.70 - 3.60	0.4 ± 0.05
Shimming	3.60 - 3.40	0.6 ± 0.05
Shimming	3.40 - 3.30	0.8 ± 0.05

Refitting the piston rings

Fitting the sealing rings

- Place the oil scraper spring on the piston.
- Re-fit the oil scraper ring with the join of spring ends on the opposite side from the ring gap and the word 'TOP' towards the crown of the piston. The chamfered side of the oil scraper ring should always be facing the piston crown.
- Fit the middle piston ring with the identification letter facing the crown of the piston. The tapered side of the middle piston ring should always be facing away from the crown of the piston.
- Fit the top piston ring with the word 'TOP' or the reference mark facing the crown of the piston.
- Offset the piston ring gaps on the three rings by 120° to each other as shown in the figure.
- Lubricate the components with engine oil.
- The top piston ring on the 250 engine has an L cross section.





N.B.

THE 2 SEALING LININGS HAVE A CONICAL SURFACE OF CONTACT WITH THE CYLINDER. THIS IS TO ENSURE A BETTER ADAPTATION.

Refitting the cylinder

- Fit the cylinder base gasket with the previously determined thickness.
- Using the fork support and the piston ring retaining band, install the cylinder as shown in the figure.

N.B.

BEFORE FITTING THE CYLINDER, CAREFULLY BLOW OUT THE LUBRICATION DUCT AND OIL THE CYLINDER BARREL.

Specific tooling

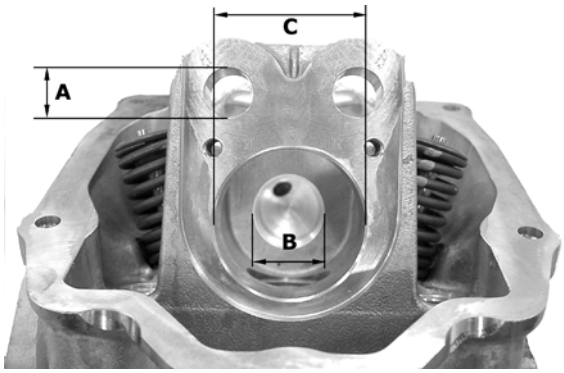
020426Y Piston fitting fork

020393Y Piston assembly band

020287Y Piston band clamps (Engine 125cc)

Inspecting the cylinder head

- Using a trued bar and feeler gauge check that the cylinder head surface is not worn or distorted. Maximum allowable runout: 0.05 mm
- Ensure that the camshaft and rocker arm pivot bearings show no signs of wear.
- Check that the cylinder head cover surface, the intake manifold and the exhaust manifold are not worn.



Characteristic

capacity "A"

Diameter 12.000 - 12.018 mm

capacity "B"

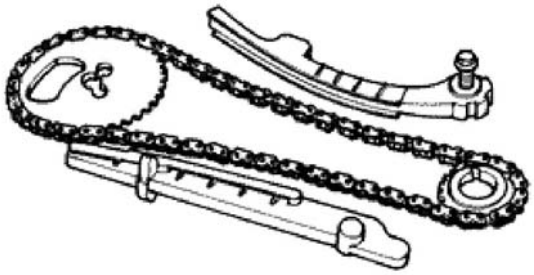
Diameter 20.000 - 20.021 mm

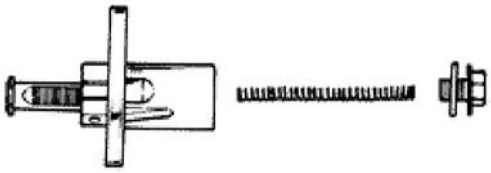
capacity "C"

Diameter 37.000 - 37.025 mm

Inspecting the timing system components

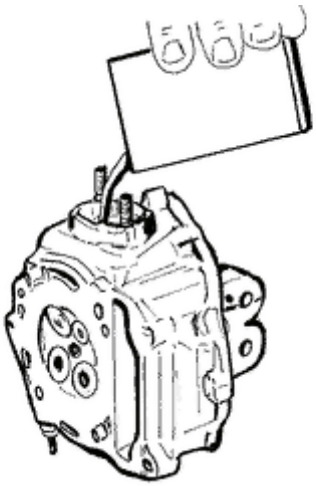
- Check that the guide shoe and the tensioner shoe are not worn out.
- Ensure that the camshaft drive pulley, the chain assembly and the sprocket wheel are not worn.
- If you encounter wear, replace the parts or, if the chain, sprocket wheel and pulley are worn replace the whole assembly.
- Remove the centre screw with the washer and the tensioner spring. Check that the one-way mechanism is not worn.
- Check the condition of the tensioner spring.
- If examples of wear are found, replace the whole assembly.





Inspecting the valve sealings

- Insert the valves into the cylinder head.
- Alternatively check the intake and exhaust valves.
- The test is carried out by filling the manifold with petrol and checking that the head does not ooze through the valves when these are just pressed with the fingers.

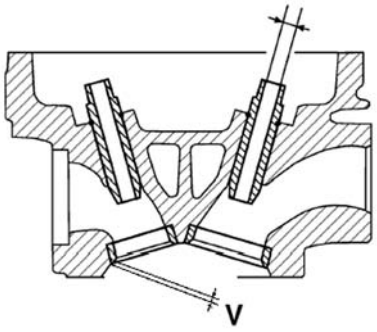


Inspecting the valve housings

- Check the width of the imprint on the valve seat"**V**" wear limit max. 1.6 mm.
- Remove any carbon formation from the valve

guides.

- Measure the inside diameter of each valve guide.
- Take the measurement at three different heights in the rocker arm push direction.
- If the width of the impression on the valve seat or the diameter of the valve guide exceed the specified limits, replace the cylinder head.



Characteristic

Valve seat wear Intake guide

limit accepted: 5.022

Valve seat wear Intake guide

Standard diameter 5.000 ÷ 5.012 mm

Valve seat wear Exhaust guide

Accepted limit 5.022

Valve seat wear Exhaust guide

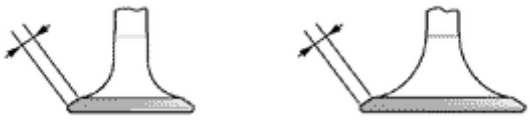
Standard diameter 5.000 ÷ 5.012 mm

Inspecting the valves

- Measure the width of the sealing surface on the valve seats and on the valves.

Sealing surface width: After use: Intake and exhaust: 1.6 mm

- If any of the sealing surfaces on the valves is wider than the specified limit or is damaged in one or more points, or curved, replace the valve with a new one.



CAUTION

DO NOT CONFUSE THE INSTALLATION POSITIONS OF THE VALVES (LEFT - RIGHT).

Characteristic

Valve wear check Standard: Intake and exhaust:

0.99 - 1.27 mm

- Measure the diameter of the valve stems in the three positions indicated in the diagram.
- Calculate the clearance between valve stem and valve guide.
- Check that there are no signs of wear on the surface of contact with the articulated register terminal.
- If no anomalies are found during the above checks, the same valves can be reused. For best sealing results, it is advisable to grind the valves. Grind the valves gently with a fine-grained lapping compound. During the grinding, keep the cylinder head with the valve axes in a horizontal position. This will prevent the lapping compound residues from penetrating between the valve stem and the guide (see figure).

CAUTION

TO AVOID SCORING THE CONTACT SURFACE, DO NOT KEEP ROTATING THE VALVE WHEN NO LAPPING COMPOUND IS LEFT. CAREFULLY WASH THE CYLINDER HEAD AND THE VALVES WITH A SUITABLE PRODUCT FOR THE TYPE OF LAPPING COMPOUND BEING USED.

N.B.

DO NOT CHANGE THE POSITIONS THE VALVES ARE FITTED IN

Characteristic

Valve check Standard length

Exhaust: 94.4 mm

Valve check Standard length

Intake: 94.6 mm

Valve check Maximum admissible clearance

Exhaust: 0.072 mm

Valve check Maximum admissible clearance

Intake: 0.062 mm

Valve check standard clearance

Exhaust: 0.025 ÷ 0.052 mm

Valve check standard clearance

Intake: 0.013 ÷ 0.040 mm

Valve check Minimum admissible diameter

Exhaust: 4.95 mm

Valve check Minimum admissible diameter

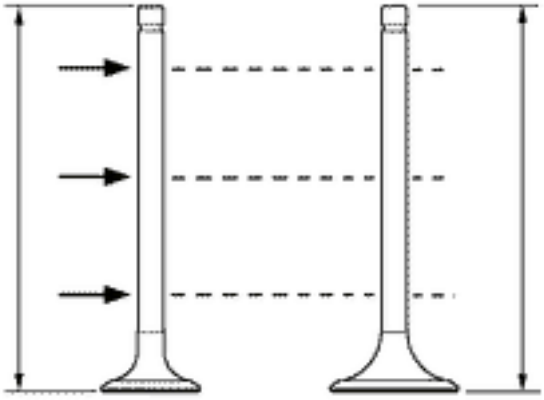
Intake: 4.96 mm

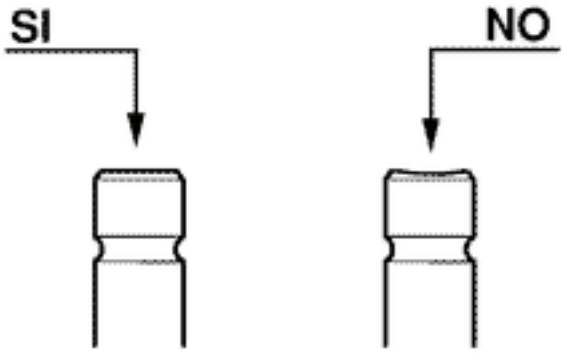
Valve check Standard diameter

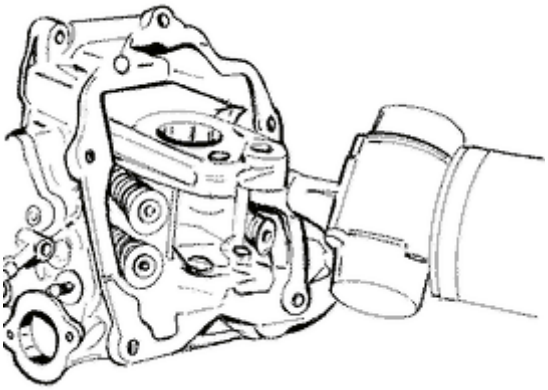
Intake: 4.972 ÷ 4.987 mm

Valve check Standard diameter

Exhaust: 4.96 ÷ 4.975 mm

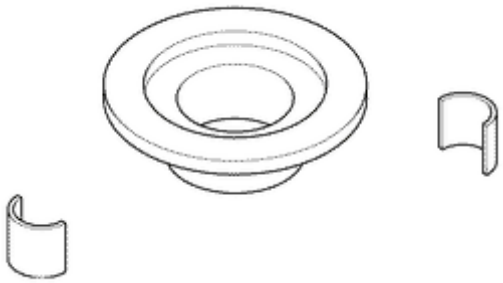






Inspecting the springs and half-cones

- Check that the upper spring caps and the cotter halves show no signs of abnormal wear.



Refitting the valves

- Lubricate the valve guides with engine oil.
- Place the valve spring supports on the head.
- Using the special punch, fit the four valve seals.
- Fit the valves, the springs and the spring retaining caps. Using the appropriate tool with adapter, compress the springs and insert the split cones in their seats.

N.B.

DO NOT CHANGE THE VALVE ASSEMBLY POSITION. FIT THE VALVES WITH THE REFERENCE COLOUR ON THE HALF-CONES SIDE (LARGER STEP CURLS).

Specific tooling

020306Y Punch for fitting valve sealing ring

020382Y Tool for removing valve cotters equipped with part 012

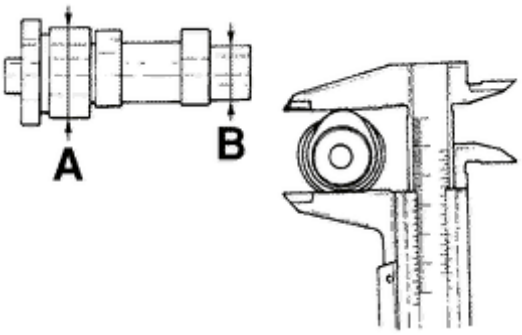
020382Y011 adapter for valve removal tool

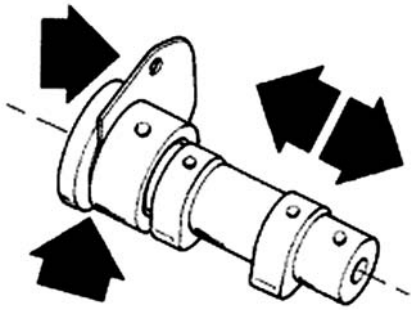
Inspecting the cam shaft

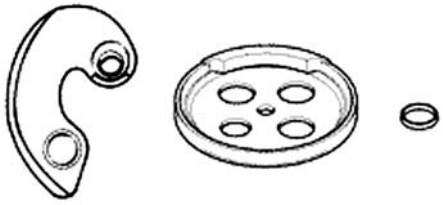
- Inspect the cam shaft for signs of abnormal wear on the cams.
- Check the cam height.
- Check there is no wear on the cam shaft retaining plate and its associated groove on the cam shaft.

- If any of the above dimensions are outside the specified limits, or there are signs of excessive wear, replace the defective components with new ones.
- Check there are no signs of wear on the automatic valve-lifter cam, or the end-of stroke roller, or the rubber buffer on the automatic valve-lifter retaining cover.
- Check the automatic valve-lifter return spring is not deformed by over-stretching.
- Replace any defective or worn components.
- Check the rocker pins do not show signs of wear or scoring.
- Measure the internal diameter of each rocker arm.

Check there are no signs of wear on the pad from contact with the cam and on the jointed adjustment plate .







Characteristic

Internal rocker arm diameter: Standard diameter

Diameter 12.000 - 12.011 mm

Rocker arm pin diameter: Standard diameter

Diameter 11.977 - 11.985 mm

Cam shaft check: Maximum admissible axial clearance

0.42 mm

Cam shaft check: Standard axial clearance:

0.11 - 0.41 mm

Cam shaft check: Standard height

Exhaust: 29.209 mm

Cam shaft check: Standard height

Intake: 30.285 mm

Cam shaft check: Minimum admissible diameter

Bearing B diameter: 19.950 mm

Cam shaft check: Minimum admissible diameter

Bearing A diameter: 36.94 mm

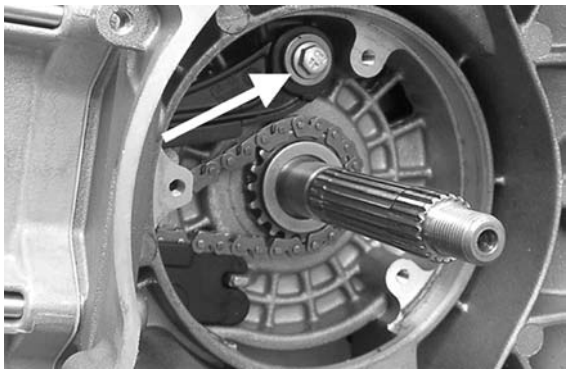
Cam shaft check: Standard diameter

Bearing B diameter: 19.959 ÷ 19.98 mm

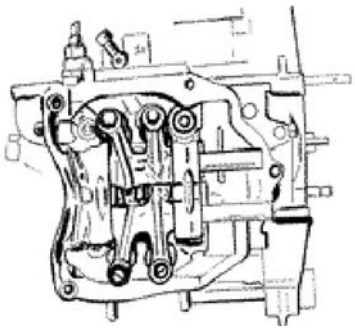
Cam shaft check: Standard diameter

Bearing A diameter: 36.95 ÷ 36.975 mm

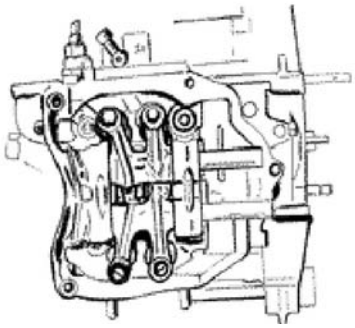
Refitting the head and timing system components



- Refit the lower timing chain sprocket wheel on the crankshaft, with the chamfer facing the insertion side.
- Loop the timing chain around the sprocket on the crankshaft.
- Fit the chain tensioner pad from the cylinder head side.
- Fit the spacer and the screw fastener.
- Tighten the screws to the prescribed torque.
- Fit the pins and rocker arms.
- Lubricate the two rocker arms through the holes at the top.
- Lubricate the bearings and insert the cam shaft in the cylinder head with the cams corresponding to the rockers.



- Insert the retention plate and tighten the two screws shown in the picture to the prescribed torque.



- Refit the spacer on the cam shaft.
- Rotate the engine so that the piston is at top dead centre, using the reference marks on the flywheel and the crankcase.
- Holding this position insert the chain on the camshaft control pulley.
- Insert the pulley on the cam shaft while keeping the reference **4V** in correspondence with the ref-

erence mark on the head.

- Fit the counterweight and tighten the clamping screw to the prescribed torque.

-Fit the end-stop ring on the automatic valve-lifter cam and fit the automatic valve-lifter cam to the cam shaft.

- Fit the automatic valve-lifter return spring.

- During this operation the spring must be loaded by approximately 180°.

- Fit the automatic valve-lifter retaining dish, using the counterweight screw fastener as a reference.

- Tighten the clamping screw to the prescribed torque.

- Set the tensioner cursor in the rest position.

- Fit the chain tensioner on the cylinder, using a new gasket, and tight the two screws to the prescribed torque.

- Insert the chain tensioning screw, together with the spring and washer, tightening it to the prescribed torque.

- Adjust the valve clearance.

- Fit the spark plug.

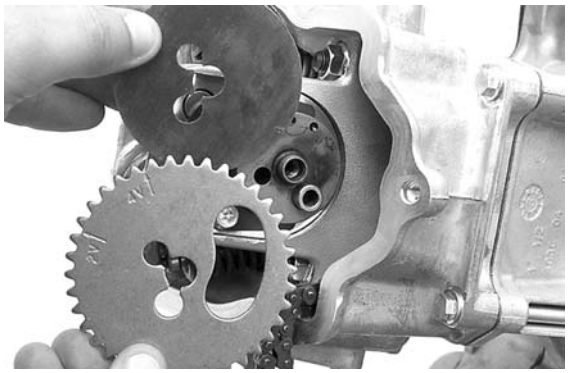
Electrode distance 0.8 mm

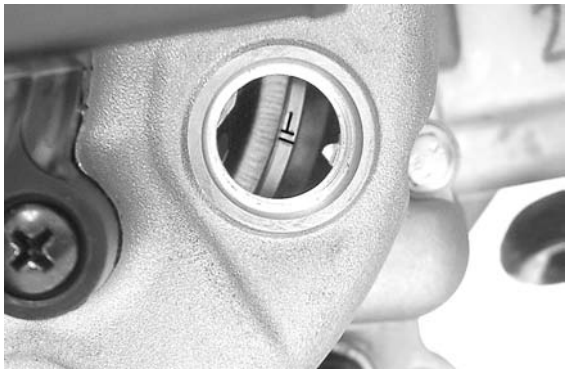
N.B.

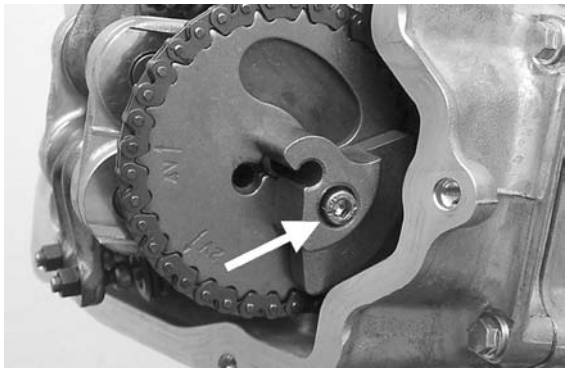
GREASE THE END STOP RING TO PREVENT IT COMING OUT AND FALLING INTO THE ENGINE.

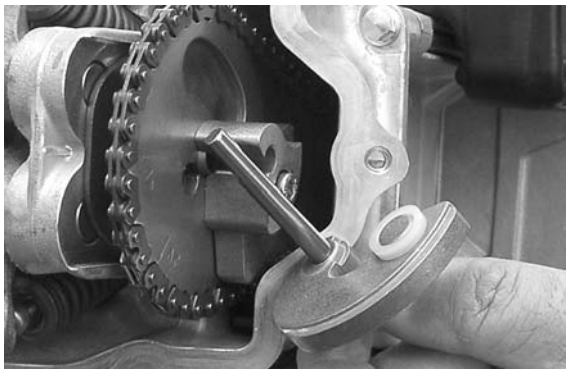
Locking torques (N*m)

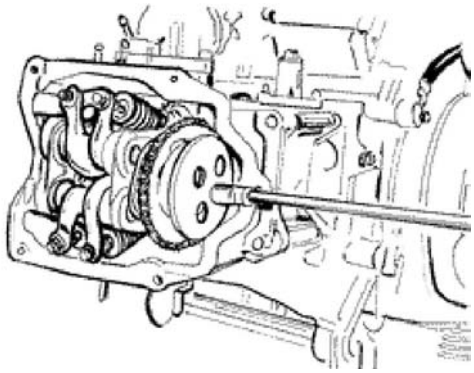
Timing chain tightener support screw 11 ÷ 13
Spark plug 12 - 14 Starter ground screw 7 ÷ 8.5 Timing chain tensioner pad screw 10 ÷ 14
Start up counterweight support screw 11 ÷ 15
Timing chain tensioner central screw 5 ÷ 6
Camshaft retention plate screw 4 ÷ 6

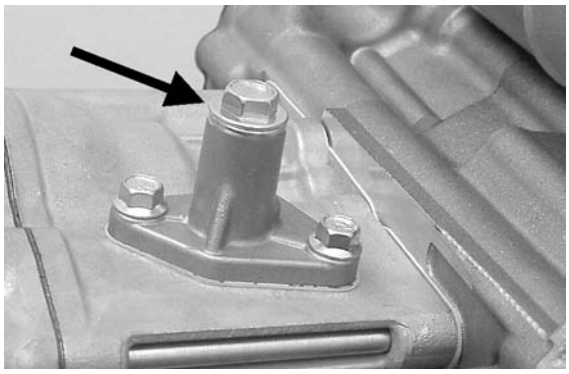




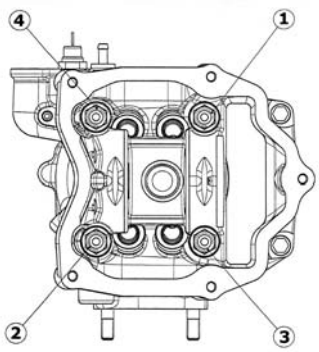








- Fit the timing chain guide pad.
- Insert the centring dowel between the cylinder head to the cylinder, fit the cylinder head gasket and the cylinder head.
- Lubricate the stud bolt threading.
- Tighten up the nuts to an initial pre-torque of 7±1 N·m
- Tighten up the nuts to a second pre-torque of 10±1 N·m
- Rotate by an angle of 270°
- To carry out the operations described above, fol-



low the tightening sequence in the figure.

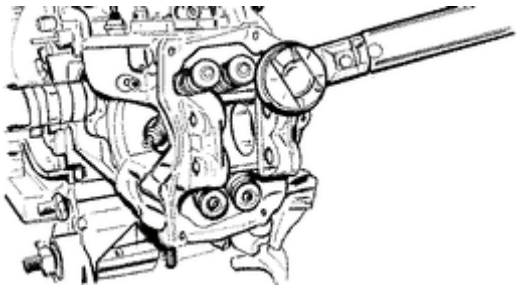
- Fit the two screws on the outside of the timing chain side and tighten them to the prescribed torque.

N.B.

BEFORE INSTALLING THE HEAD, MAKE SURE THAT THE LUBRICATION CHANNEL IS CLEAN USING A COMPRESSED AIR JET.

Locking torques (N*m)

Timing chain tightener support screw 11 ÷ 13

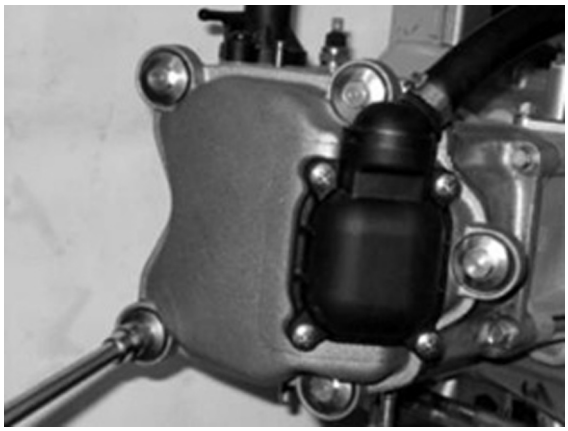


Refitting the rocker-arms cover

- Refit the cylinder head cover, tightening the 5 clamping screws to the prescribed torque.
- Make sure the gasket is positioned properly.

Locking torques (N*m)

Tappet cover screws 6 - 7 Nm



Refitting the intake manifold

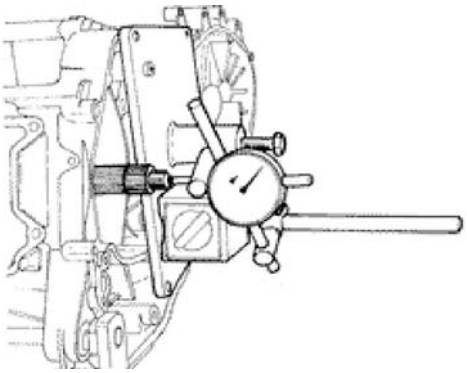
- Install the intake manifold and tighten the 3 screws.

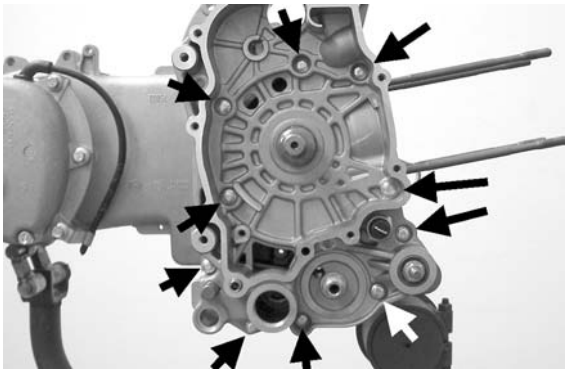
N.B.

FOR THE SPECIAL SCREWS OF VERSION 125CC, USE INSERTS AND INSERT HOLDERS AVAILABLE ON THE MARKET.

Crankcase - crankshaft

Splitting the crankcase halves



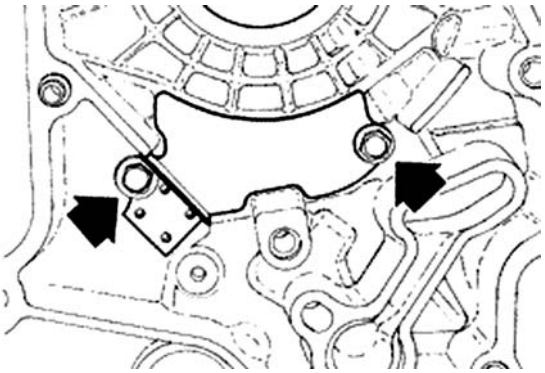


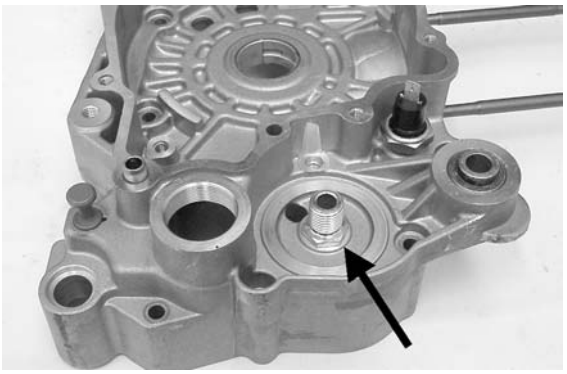
- Before opening the crankcase, it is advisable to check the axial clearance of the crankshaft. To do this, use a plate and a support with appropriate tool dial gauge.
- Upper clearances are an indication of wear on the surfaces of the crankshaft casing support.
- Remove the ten crankshaft coupling screws.
- Separate the crankcase while keeping the crankshaft in one of the two halves of the crankcase.
- Remove the crankshaft .
- Remove the half crankcase coupling gasket.
- Remove the two screws and the internal cover shown in the diagram.
- Remove the oil guard on the flywheel side.
- Remove the oil filter fitting shown in the diagram.
- Check the axial clearance on the connecting rod.
- Check the radial clearance on the connecting rod.
-Check the surfaces that limit the axial free-play

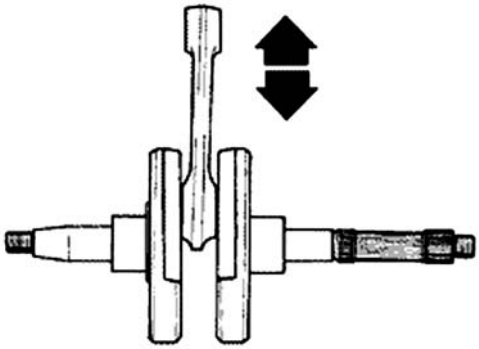
are not scored and measure the width of the crankshaft between these surfaces, as shown in the diagram.

- If the axial clearance between crankshaft and crankcase is exceeding and the crankshaft does not have any defect, the problem must be due to either excessive wear or wrong machining on the crankcase.

- Check the diameters of both the bearings of the crankshaft in accordance with the axes and surfaces shown in the figure. The half-shafts are classified in two categories Cat. 1 and Cat. 2 as shown the chart below.







CAUTION

THE CRANKSHAFT CAN BE REUSED WHEN THE WIDTH IS WITHIN THE STANDARD VALUES AND THE SURFACES SHOW NO SIGNS OF SCORING.

CAUTION

WHILE OPENING THE CRANKCASES AND REMOVING THE DRIVING SHAFT, CHECK THAT THE THREADED SHAFT ENDS DO NOT INTERFERE WITH THE MAIN BUSHINGS. FAILURE TO OBSERVE THIS PRECAUTION CAN DAMAGE THE MAIN BUSHINGS.

CAUTION

KEEP THE CRANKSHAFT IN ONE OF THE TWO HALVES OF THE CRANKCASE WHEN SEPARATING IT. IF YOU FAIL TO DO THIS, THE CRANKSHAFT MIGHT ACCIDENTALLY FALL.

N.B.

WHEN MEASURING THE WIDTH OF THE CRANKSHAFT, MAKE SURE THAT THE MEASUREMENTS ARE NOT MODIFIED BY THE RADIUSES OF FITTINGS WITH THE CRANKSHAFT BEARINGS.

Specific tooling

020262Y Crankcase splitting strip

020335Y Magnetic support for gauge

Characteristic

Axial crankshaft/crankcase clearance: Standard clearance

0.15 - 0.40 mm (when cold)

Axial connecting rod - crankshaft clearance Standard clearance

0.20 ÷ 0.50 mm

Radial connecting rod - crankshaft clearance Standard clearance

0.036 ÷ 0.054 mm

Width of crankshaft with integral washers: standard measurements

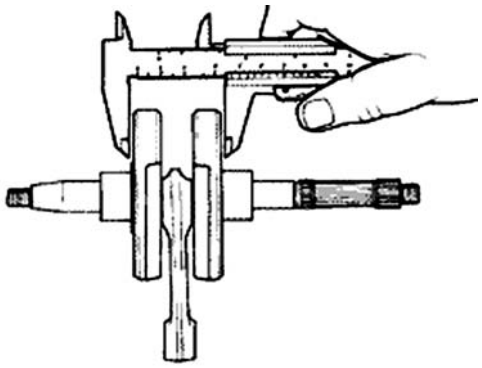
55.67 ÷ 55.85 mm

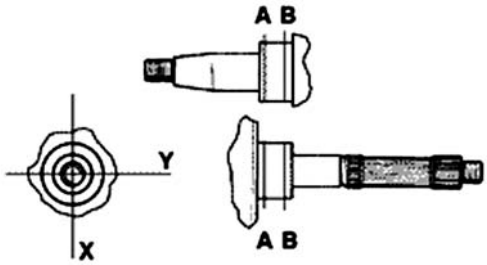
Crankshaft bearings: Standard diameter Cat. 1

28.994 ÷ 29.000

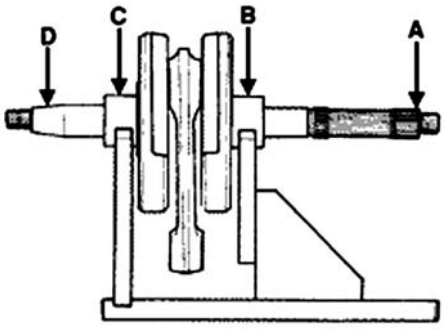
Crankshaft bearings: Standard diameter Cat. 2

29.000 ÷ 29.006





Inspecting the crankshaft alignment



To install the drive shaft on the support and to measure the misalignment in the 4 points indicated in figure.

- Check that the driving shaft cone, the tab seat, the oil seal capacity, the toothed gear and the threaded tangs are in good working order.
- In case of failures, replace the driving shaft.

The connecting rod head bushings cannot be replaced.

For the same reason, the connecting rod may not be replaced and, when cleaning the crankshaft, be very careful that no impurities get in through the shaft's lubrication holes.

In order to prevent damaging the connecting rod bushings, do not attempt cleaning the lubrication duct with compressed air.

- Make sure that the 2 pads on the crank button

are properly mounted.

- A wrong installation of a buffer can seriously affect the bushing lubrication pressure.

N.B.

THE MAIN BEARINGS ARE NOT GRINDABLE

Specific tooling

020074Y Support base for alignment control of crankshaft

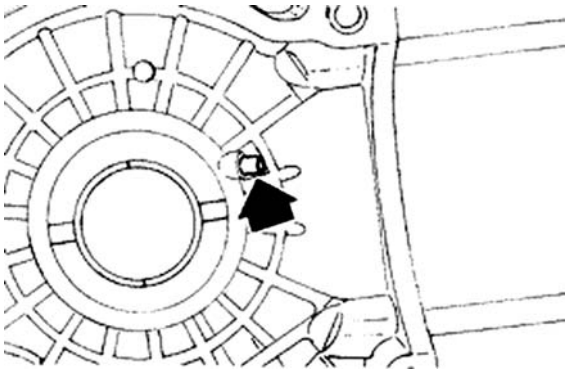
Characteristic

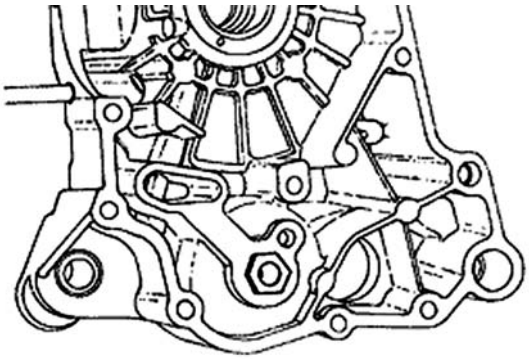
Off-line maximum admitted

A = 0.15 mm

B = 0.01 mm
C = 0.01 mm
D = 0.10 mm

Inspecting the crankcase halves



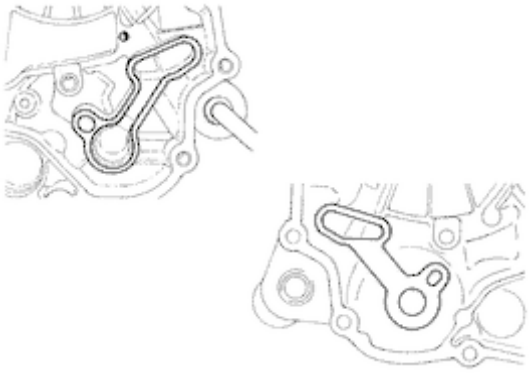


- Before proceeding to check the crankcase halves, thoroughly clean the all surfaces and oil ducts.
- On the transmission side crankcase half, take particular care cleaning the housing and oil ducts for the following components: the oil pump, the oil by-pass valve, the main bushings and the cooling jet on the transmission side (see diagram).
- Take particular care, also, that there are no signs wear oil by-pass valve housing (see Chapter Lubrication), as this could prevent a good seal in the valve, which regulates the oil pressure.
- On the flywheel side crankcase half, take particular care cleaning the oil ducts for the main bushings, the oil duct for the jet that lubricates the cylinder head and the oil drainage duct at the flywheel side oil seal.
- Inspect the mating surfaces on the crankcase halves for scratches or deformation, taking partic-

ular with the surfaces that mate with the cylinder and the mating surfaces between the crankcase halves.

- Defects in the crankcase coupling gasket between the crankcase halves or the mating surfaces shown in the diagram, could cause a drop in the oil pressure lubricating the main bearings and connection rod.

- Check the main bearing seats that limit axial clearance in the crankshaft show no signs of wear. The dimension between these seats is measured by way of the procedure described previously for measuring the crankshaft axial clearance and dimensions.



N.B.

THE JET IS FED THROUGH THE MAIN BUSHINGS. PROPER OPERATION OF THIS COMPONENT IMPROVES THE PISTON TOP COOLING. CLOGGING HAS EFFECTS THAT ARE DIFFICULT TO DETECT (PISTON TEMPERATURE INCREASE). FAILURE OR LEAK CAN CONSIDERABLY DECREASE THE MAIN BUSHING AND CONNECTING ROD LUBRICATION PRESSURE.

N.B.

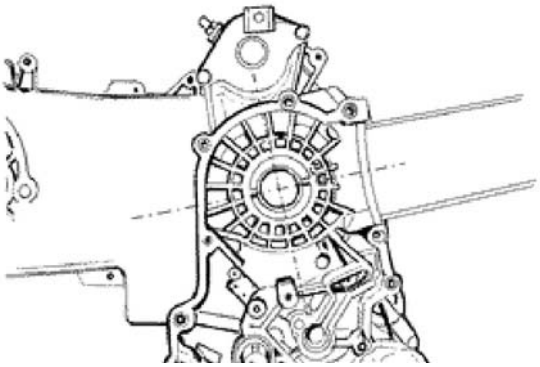
THE HEAD LUBRICATION CHANNEL IS PROVIDED WITH A SHUTTER JET; THIS GIVES A "LOW PRESSURE" HEAD LUBRICATION; THIS CHOICE WAS MADE TO REDUCE THE OIL TEMPERATURE IN THE SUMP. THE JET CLOGGING IMPAIRS THE HEAD LUBRICATION AND THE TIMING MECHANISMS. A JET FAILURE CAUSES A DECREASE OF THE MAIN BUSHING AND CONNECTING ROD LUBRICATION PRESSURE.

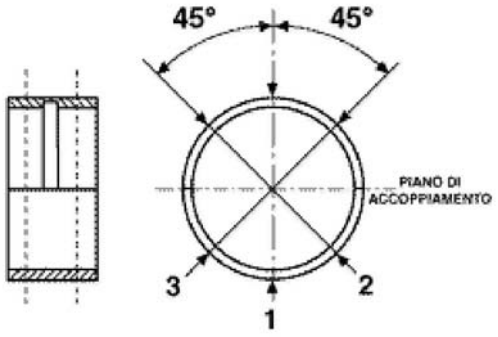
Inspecting the crankshaft plain bearings

- To obtain a proper lubrication of the brasses, it is necessary to have an optimum lubrication pressure (3,2 bar) and a good oil rate; to this purpose, the brasses must be placed properly, so as to not

have shuttering in the oil feeding channels.

- Bench brasses are realised with 2 half-bearings, one of which is solid while the other has holes and seats for lubrication.
- The solid half-bearing is intended to stand the thrusts caused by combustion, and for this reason it is arranged opposed the cylinder.
- To prevent shutters in the oil feeding channels, the matching surface of the two half-bearings must be perfectly orthogonal to the cylinder axis, as shown in the figure.
- The oil feeding channel section is also affected by the brass driving depth relative to the driving shaft axial clearance containment plane.
- Check the brass diameter in the 3 directions shown in the figure.
- Repeat the measurements for the other half of the brass. See figure.
- The crankcase is supplied in three setup versions: with RED brasses, with BLUE brasses and with YELLOW brasses.
- The brass housing hole is in the only category reported below.
- The standard brass diameter after driving is variable on the basis of a coupling selection.
- The brass seats into the crankcases are classified into 2 categories as for the driving shaft Cat. 1 and Cat. 2.
- Brasses are divided into 3 categories according to their thickness. See the table below:





TYPE	IDENTIFICATION
A	RED
B	BLUE
C	YELLOW

	Type "A" - RED	Type "B" - BLUE	Tipo "C" - YELLOW
Bench half-bearing	1,970 ÷ 1,973	1,9703 ÷ 1,976	1,976 ÷ 1,979

Brass category	Half-crankcase category	Brass inside diameter after reassembly	Possibility of assembly
A	1	29,025 ÷ 29,040	**Original**
B	1	29,019 ÷ 29,034	**Original and spare**
	2	29,028 ÷ 29,043	
C	2	29,022 ÷ 29,037	**Original**

Match the shaft with two category 1 shoulders with category 1 crankcase (or cat. 2 with cat. 2).A spare crankcase cannot be combined with a driving shaft with mixed categories. Spare shafts have half-shafts of the same category.

Half-crankcase	Engine half-shaft	Brass
Cat.1	Cat.1	B
Cat.2	Cat.2	B
Cat.1	Cat.2	A
Cat.2	Cat.1	C

N.B.

TO KEEP THIS POSITION OF THE BUSHINGS ON THE CRANKCASE, FITTING IS FORCED ON STEEL RINGS INSERTED IN THE CASTING OF BOTH HALF-CRANKCASES.

N.B.

DO NOT TAKE THE MEASUREMENT ON THE TWO HALF-SHELL COUPLING SURFACE SINCE THE ENDS ARE RELIEVED TO ALLOW BENDING DUR-

ING THE DRIVING OPERATION.

N.B.

CRANKCASES FOR REPLACEMENTS ARE SELECTED WITH HALF-CRANKCASES OF THE SAME CATEGORY AND ARE FITTED WITH CATEGORY B BUSHINGS (BLUE)

Characteristic

Standard driving depth

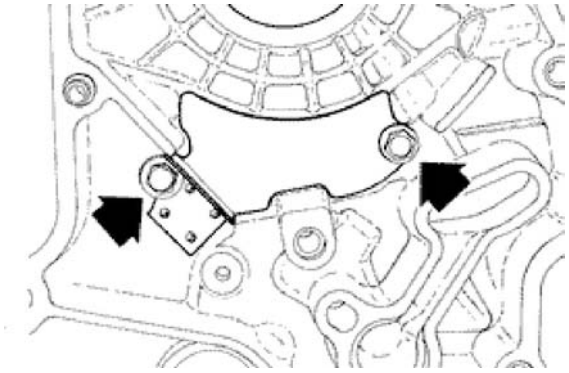
1.35 ÷ 1.6

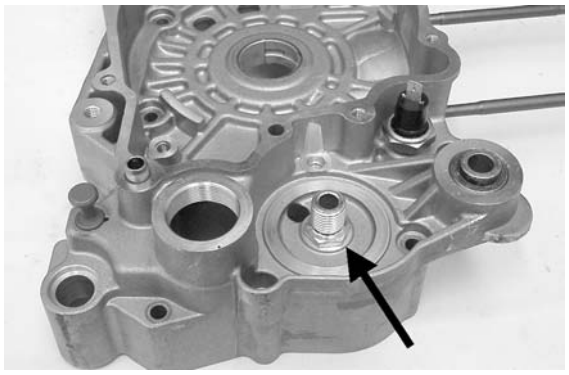
Diameter of crankcase without bushing

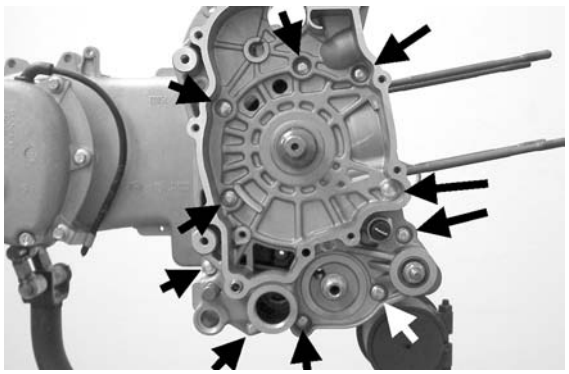
32.953 ÷ 32.963

Refitting the crankcase halves

- Assemble the internal bullkhead by locking the 2 screws to the prescribed torque.
- Mount the oil filter union, tightening it to the prescribed torque.
- Position the gasket on the half case together with the centring dowels, preferably on the transmission side of the half case.
- Lubricate the bench bronzes and insert the driving shaft on the transmission side of the half case.
- Join the 2 half cases.
- Mount the 10 screws and lock to the prescribed torque.
- Mount a new O-ring on the precleaner and lubricate it.
- Insert the precleaner on the engine with relative plug. Lock to the prescribed torque.

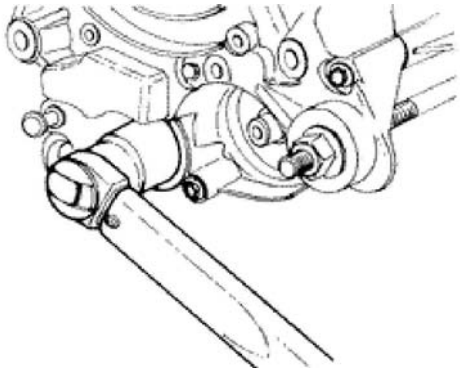






Locking torques (N*m)

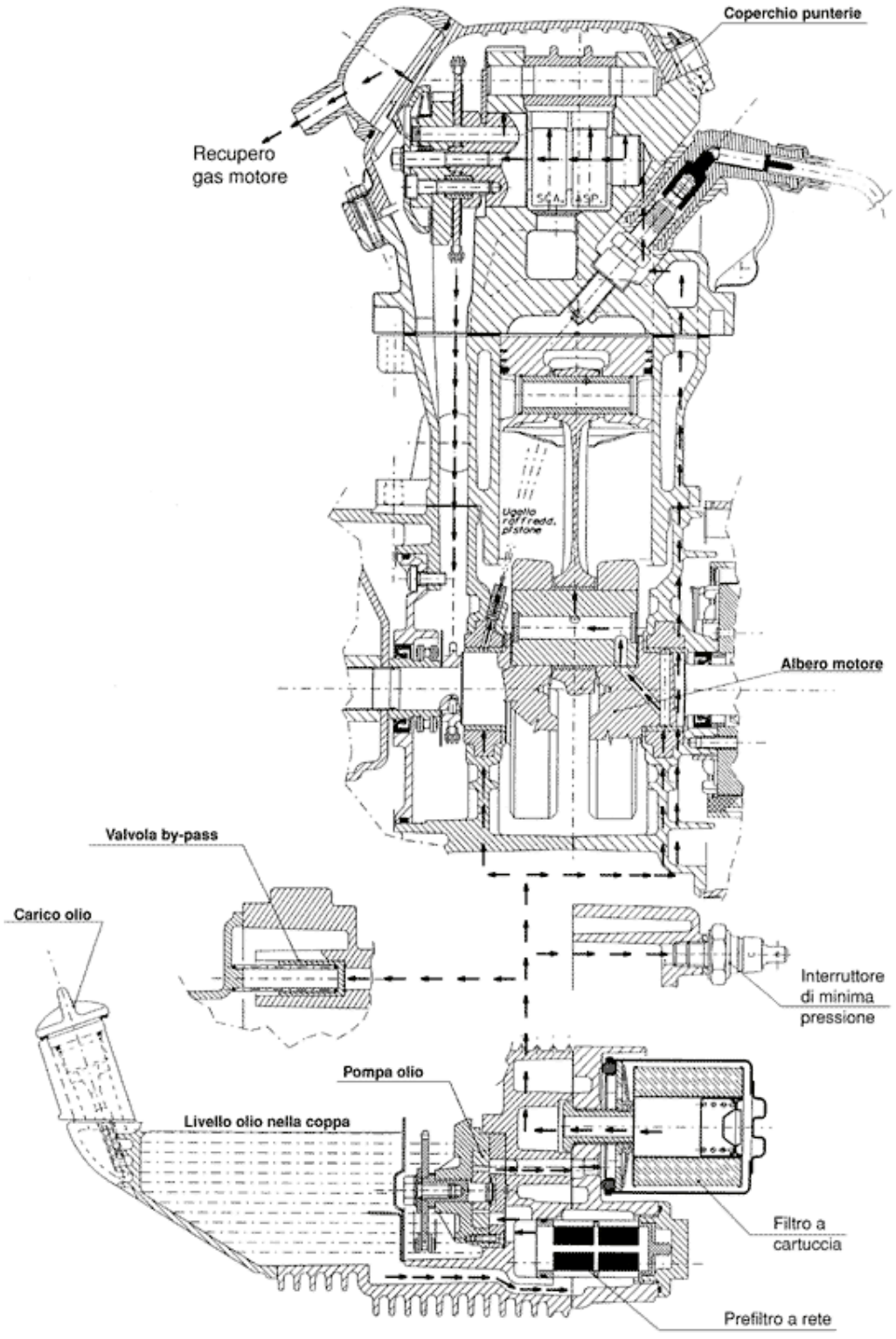
Internal engine crankcase bulkhead (transmission-side half shaft) screws 4 ÷ 6 Engine crankcase coupling screws 11 - 13 Oil filter on the crankcase fitting 27 ÷ 33 Engine oil drainage tap/gauze filter 24 ÷ 30



Lubrication

Conceptual diagrams

LUBRICATION CIRCUIT



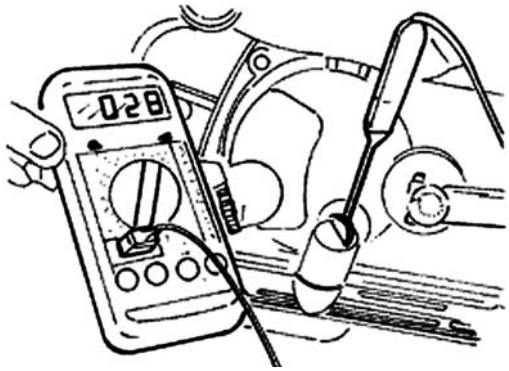
Oil pressure check

- After removing the flywheel cover as explained

in the Flywheel chapter, disconnect the minimum

oil pressure switch electric connection and remove the switch.

- With engine at 1,650 rpm, and with oil at a temperature of ~90°C, check that oil pressure ranges between 0.5 - 1.2 atm.
- With engine at 6000 rpm, and with oil at a temperature of ~90°C, check that oil pressure ranges between 3.2 - 4.2 atm.
- After the check, remove the specific tools mounted on the engine, replace the oil pressure switch and the washer and lock at the prescribed tightening torque, then install the flywheel cover.
- In case of non-conforming pressure, check the oil filter, the by-pass, the oil pump and the seals on the driving shaft in a sequence.



N.B.

THE CHECK MUST BE CARRIED OUT WITH OIL AT THE CORRECT LEVEL AND WITH AN OIL FILTER IN GOOD CONDITION.

Characteristic

Oil pressure

Minimum pressure admitted at 6000 rpm: 3.2 atm.

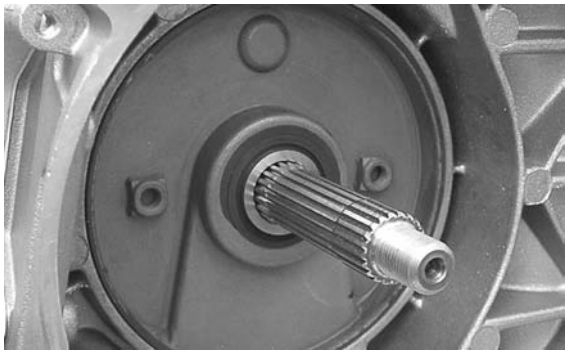
Locking torques (N*m)

Minimum oil pressure sensor 12 - 14

Crankshaft oil seals

Removal

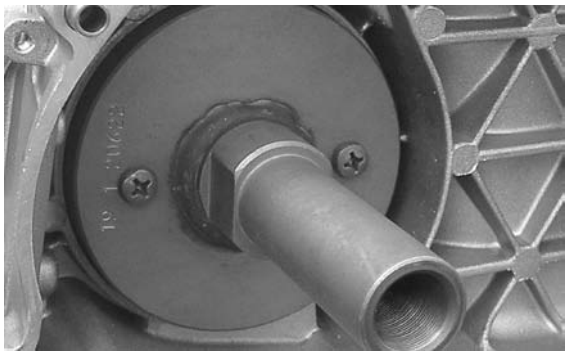
- Remove the transmission cover and the complete drive pulley beforehand



- Install the base of the appropriate tool on the oil guard using the screws provided.

Specific tooling

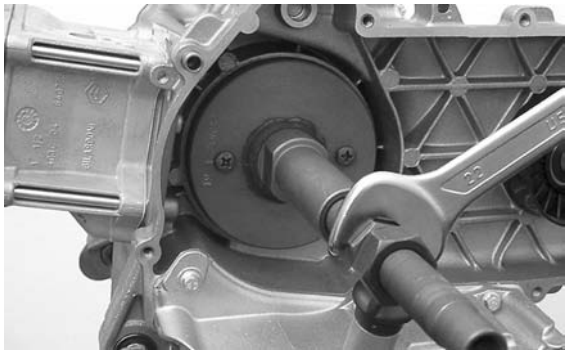
020622Y Transmission-side oil guard punch



- Screw the threaded bar onto the base of the tool and extract the oil guard.

Specific tooling

020622Y Transmission-side oil guard punch



Refitting

-Check that the chain tightening sliding block is not worn.

- If so, replace it or install it in the reverse direction, making it work on the opposed side.

- Remove the oil guard using the specific tools.

- Prepare the new oil guard lubricating the sealing lip

- Pre-assemble the oil guard with the specific tool

by slightly tightening the screws.

- Insert the sheath on the driving shaft.- Insert the tool with the oil guard on the driving shaft up to touch the crankcase

- Finally position the oil guard installing the bracket of the specific tool.

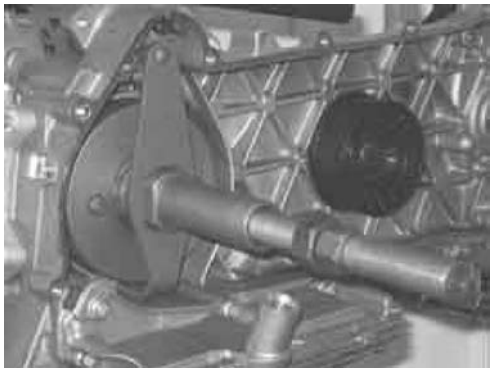
- Screw the threaded bar on the driving shaft to travel end

- Using the nut, operate on the base of the specific tool to perceive the oil guard mounting travel end.

- Remove all of the tool components according to the reverse order

- Place the cover on the engine crankcase, apply the three screws with copper washers and install the cover into its seat by the three screws.

- Tighten the 3 screws at the prescribed torque.



CAUTION

DO NOT LUBRICATE THE SURFACE FOR KEYING ONTO THE ENGINE CRANKCASE.

CAUTION

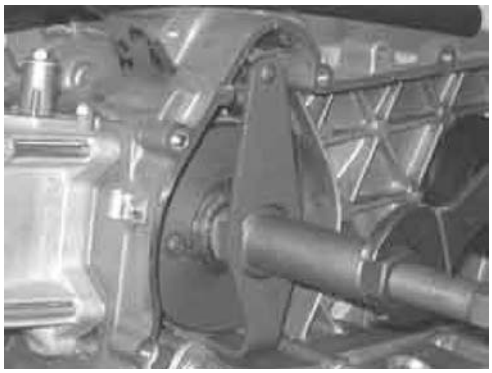
ORIENT THE OIL GUARD BY POSITIONING THE CHAIN HOUSING CHANNEL FACING DOWNWARDS. WHEN THE POSITION IS REACHED, DO NOT RETRACT THE OIL GUARD. FAILURE TO COMPLY WITH THIS RULE CAN CAUSE A WRONG POSITIONING OF THE OIL GUARD SHEATH.

CAUTION

FAILURE TO COMPLY WITH THIS ASSEMBLY PROCEDURE CAN SERIOUSLY DAMAGE THE ENGINE DUE TO THE WRONG TENSIONING OF THE OIL PUMP CONTROL CHAIN.

Specific tooling

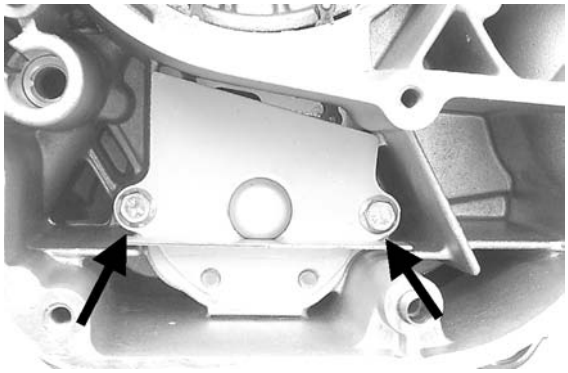
020622Y Transmission-side oil guard punch

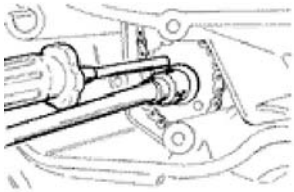


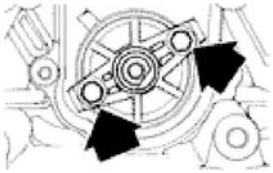
Oil pump

Removal

- Undo the two clamping screws in the figure and remove the cover over the pump control crown.







- Block the rotation of the oil pump control pulley with a screwdriver inserted through one of its two holes.
- Remove the central screw with Belleville washer, as shown in the diagram.
- Remove the chain with the crown.
- Remove the control sprocket with relative O-ring.
- Remove the oil pump by unscrewing the two screws in the figure.
- Remove the oil pump seal.

N.B.

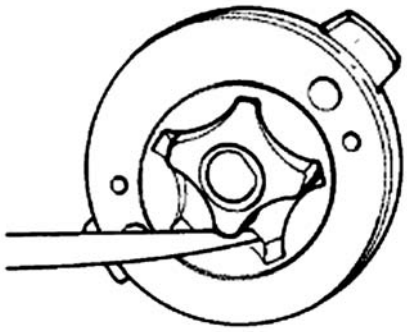
IT IS ADVISABLE TO MARK THE CHAIN IN ORDER TO ENSURE THAT THE INITIAL DIRECTION OF ROTATION IS MAINTAINED.

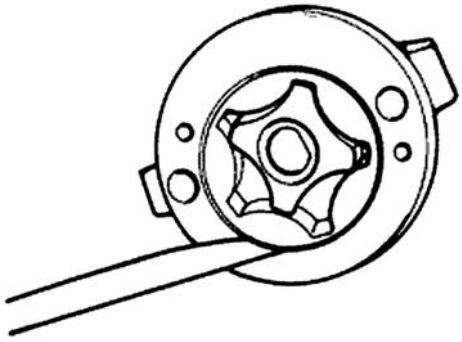
Inspection

- Remove the two screws and the oil pump cover.
- Remove the clip retaining the innermost rotor.
- Remove and wash the rotors thoroughly with petrol and compressed air.
- Reassemble the rotors in the pump body, keeping the two reference marks visible Replace the clip.
- Check the clearance between the rotors in the position shown in the diagram.

Measure the distance between the outer rotor and the pump body (see figure).

- Check the axial clearance of the rotors using a trued bar as shown in the figure.





Characteristic

Axial rotor clearance

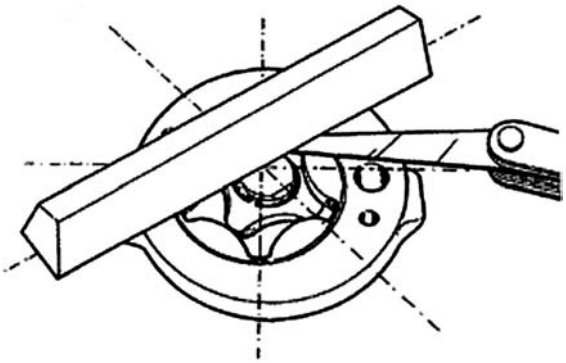
Limit values admitted: 0.09 mm

Distance between the outer rotor and the pump body

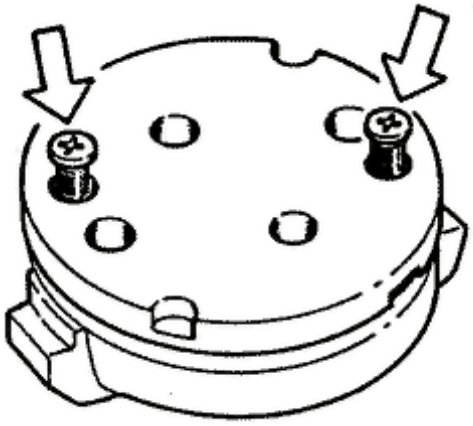
Admissible maximum clearance 0.20 mm

Distance between the rotors

Admissible maximum clearance 0.12 mm



Refitting



- Check there are no signs of wear on the oil pump shaft or body.
- Check there are no signs of scoring or wear on the oil pump cover.
- If you detect non-conforming measurements or scoring, replace the faulty parts or the assembly.
- Fit the pump cover in the position that permits the crankcase clamping screws to be aligned.
- Make sure the gasket is positioned properly and refit the pump on the engine crankcase. The pump can only be fitted in one position. - Tighten the screws to the prescribed torque.
- Fit the sprocket wheel with a new O-ring.
- Fit the chain.
- Fit the pulley, the central screw and the Belleville washer. Tighten to the prescribed torque.
-Fit the oil pump cover, by tightening the two screws to the prescribed torque.

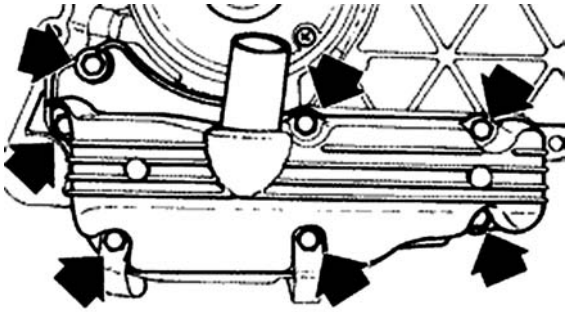
N.B.

FIT THE BELLEVILLE WASHER SO THAT ITS OUTER RIM TOUCHES THE PULLEY. MAKE SURE THAT THE PUMP TURNS FREELY.

Locking torques (N*m)

Screws mounting the oil pump to the crankcase 5 - 6 Oil pump command crown screw 10 ÷ 14 Oil pump cover screws 0.7 - 0.9

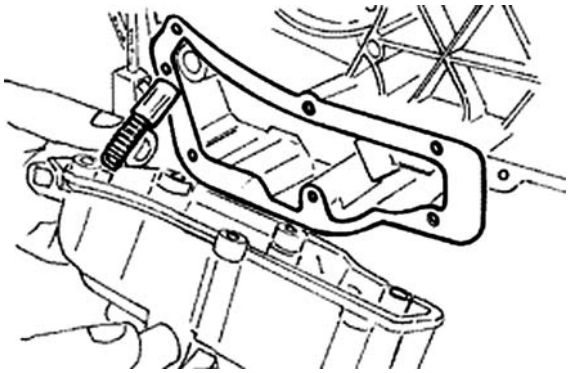
Removing the oil sump



- Remove the oil tank cap, the transmission cover, the complete drive pulley assembly with belt and the sprocket wheel, as described in the Transmission chapter.
- Drain the oil as described previously.
- Remove the seven screws, shown in the diagram, and the two rear brake fluid pipe fixing

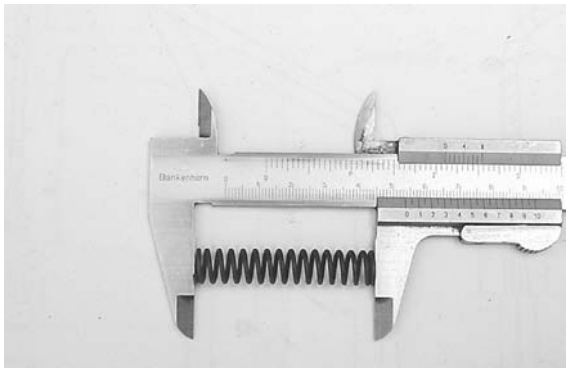
brackets.

- Remove the screw, the by-pass piston, the gasket and centring dowels shown in the figure.



Inspecting the by-pass valve

- Check the free length of the spring.
- Check that the small piston is not scored.
- Ensure that it slides freely on the crankcase and that it guarantees a good seal.
- If not, eliminate any impurities or replace defective parts.



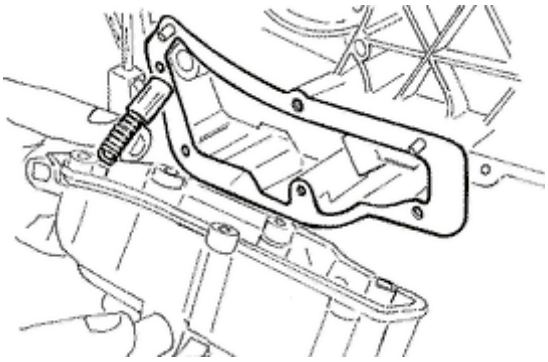
Characteristic

By-pass check up: Standard length

54.2 mm

Refitting the oil sump

- Refit the by-pass valve plunger in its housing.
- Insert the pressure-regulating spring.
- Fit a new sump seal.
- Refit the two centring dowels.
- Refit the sump, taking care to locate the spring in the appropriate recess machined into the inside of the sump.
- Refit the rear brake cable brackets and the screws in the reverse order from which they were removed.
- Tighten the screws to the prescribed torque.
- Refit the drive pulley assembly, the drive belt, the sprocket wheel and the transmission cover,



as described in the "Transmissions" chapter.

- When testing the lubrication system, refer to chapter "Crankcase and Crankshaft", regarding lubrication of the crankshaft and connecting rod

Locking torques (N*m)

Oil sump screws 10 ÷ 14

SAS valve

Inspecting the one-way valve

- Remove the SAS valve
- Temporarily install the rubber sleeve at the outlet of the SAS valve ensuring its seal
- Connect the vacuum pump MITYVAC to the rubber sleeve as shown in the figure
- Set the pump in vacuum position (VACUUM)
- Slowly open the pump
- Check that the unidirectional valve allows the passage of the air generating a small vibration.
- Switch the pump to pressure position (PRESSURE)
- Slowly open the pump and check that there is an increase of pressure. Little leaks are normal. In case of faults, replace

N.B.

AN INCORRECT OPERATION OF THE UNIDIRECTIONAL VALVE CAN CAUSE THE OVERHEATING OF THE RUBBER SLEEVE AND FILTERS.

N.B.

THE ABSENCE OF VIBRATIONS INDICATES A POOR SEALING.

Specific tooling

020329Y MITYVAC vacuum pump

Inspecting the cut-off

- Remove the SAS valve
- Connect the MITYVAC pump in vacuum position (VACUUM) to the CUT - OFF valve vacuum inlet
- Apply a vacuum of over 0.5 BAR
- Check that this value is maintained over time
- If the value is not maintained, proceed to replace
- Using a «T» branch and rubber hoses, implement a parallel connection between the rubber sleeve and the vacuum inlet of the CUT - OFF valve
- Connect the branch to the MITYVAC pump
- Set the pump in vacuum position (VACUUM)
- Using pliers with flat and long tips, temporarily clamp the rubber hose in the proximity of the valve
- Command the pump to create a vacuum of over 0.5 BAR
- Release the hose and check the vacuum behaviour
- In normal operating conditions, the vacuum undergoes a drop and then settles. Then there occurs a gradual and slow depression up to the value of about 0.4 BAR. At this point, the valve opens and vacuum suddenly resets.

A seal failure or opening at different vacuum values are abnormal. Proceed to the replacement.

N.B.

BESIDES IMPAIRING THE FUNCTIONALITY OF THE CUT - OFF, AN INCORRECT SEAL OF THE CUT - OFF VALVE MEMBRANE AFFECTS THE IDLE OPERATION.

N.B.

A SEAL FAILURE OF THE CUT - OFF VALVE

CAUSES EXHAUST NOISE (EXPLOSIONS IN THE SILENCER). A WRONG CALIBRATION OF THE CUT - OFF VALVE CAN IMPAIR THE CORRECT FUNC-TIONALITY OF THE CATALYTIC CONVERTER.

Specific tooling

020329Y MITYVAC vacuum pump

Fuel supply

Removing the carburettor

Kehin

- To disconnect the carburettor from the engine, it is necessary to move the air filter and remove the gas control transmission, the automatic starter connection, the clamps fixing the carburettor to the filter box and to the intake manifold, the pipe feeding air to the membrane, and the intake union.
- Extract the carburettor and turn it to remove the screw with the water union and relevant pipes.

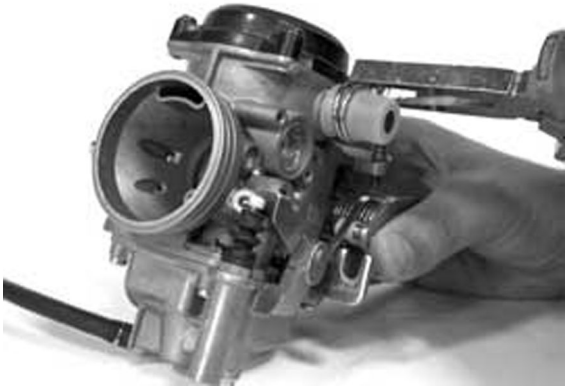
N.B.

THIS OPERATION IS REQUIRED TO PREVENT EMPTYING THE COOLING SYSTEM.

Remove the guard, the bracket and the starter by releasing the screw shown in the figure.

Remove the 2 screws and the starter support with the gasket.

Remove the clamp and the cap with the membrane chamber aeration filter.



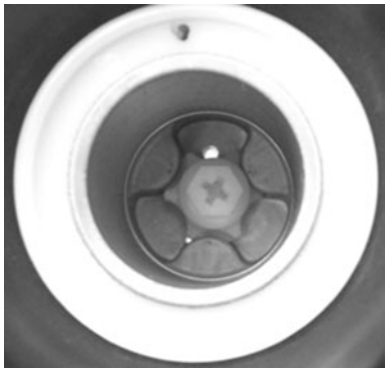
Remove the 4 fixing screws shown in the figure and the vacuum chamber cover.

WARNING

DURING THE COVER REMOVAL, BE CAREFUL TO THE SUDDEN PROJECTION OF THE SPRING.

Remove the vacuum valve with the membrane.

Loosen the coupling by 1/8 turn and remove it, remove the spring and the vacuum valve pin.



Remove the 4 screws shown in the figure.

Remove the basin with the pickup pump, control and gasket.

- Remove the sealing gasket.
- Remove the pickup pump intake and delivery valves from the basin.

N.B.

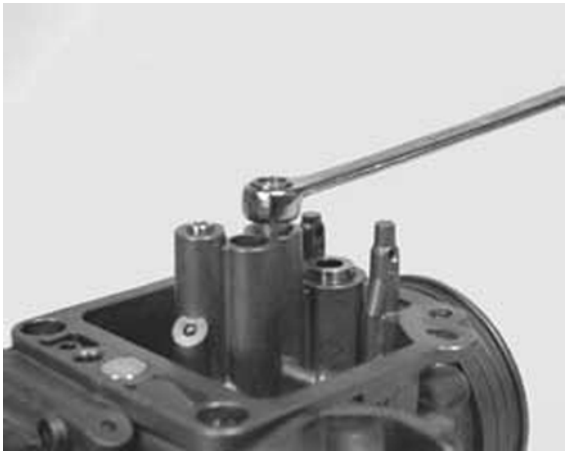
BE VERY CAREFUL SINCE VALVES CONSIST OF NOZZLE, SPRING AND BALL

N.B.

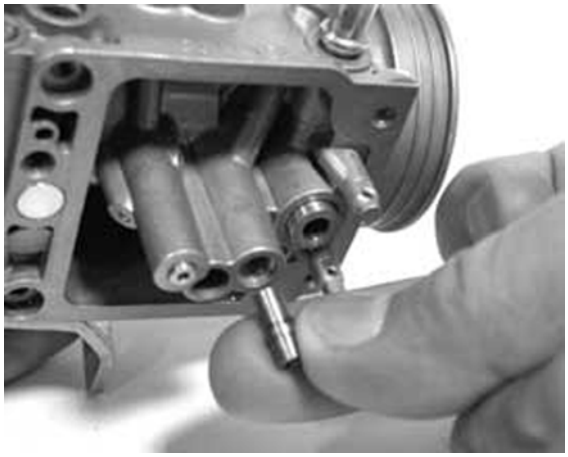
DO NOT REMOVE THE PICKUP PUMP PISTON AND RELEVANT CONTROL.

- Suitably support the carburettor and remove the float pin by a hammer from the gas control side.
- Remove the float and the pin.
- Remove the maximum nozzle.

Remove the maximum nozzle.



Remove the emulsifier.

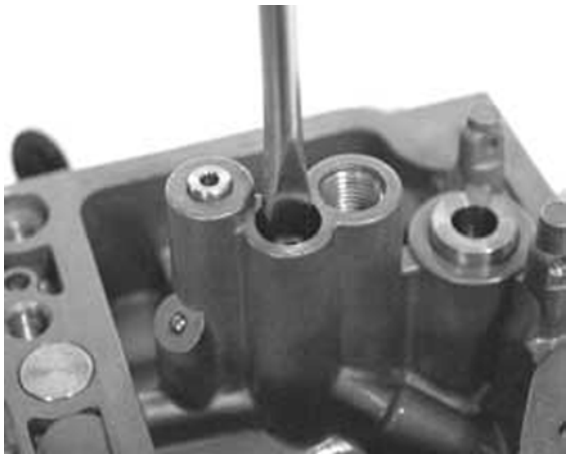


Remove the spray nozzle.

N.B.

THIS OPERATION IS REQUIRED TO PREVENT LOSING THE SPRAY NOZZLE DURING THE CARBURETTOR CLEANING OPERATIONS. IF THE SPRAY NOZZLE IS FORCED INTO ITS SEAT, DO NOT REMOVE IT TO PREVENT DAMAGING IT.

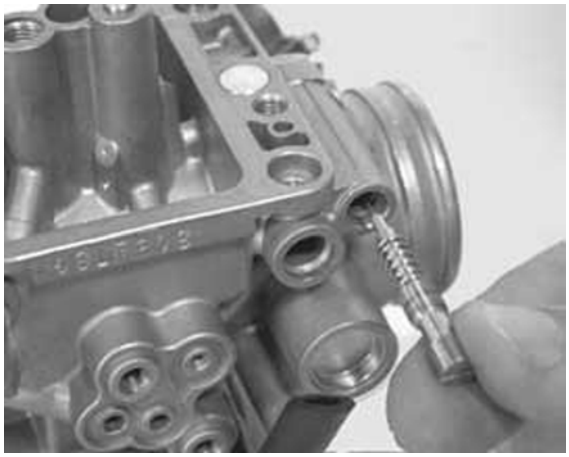
Remove the minimum nozzle.



Remove the minimum flow adjustment screw and the spring.

CAUTION

DO NOT REMOVE THE COMPONENTS FIXED INTO THE CARBURETTOR BODY, SUCH AS: FUEL FEEDING DUCT, PIN SEAT, STARTER NOZZLE, PICKUP NOZZLE AND PIT CAP, MINIMUM AND MAXIMUM AIR CALIBRATOR, THROTTLE VALVE CONTROL SHAFT. DO NOT REMOVE THE SCREWS FIXING THE THROTTLE TO THE SHAFT. THE FIXING SCREWS ARE CAULKED AFTER ASSEMBLY AND THEIR REMOVAL DAMAGES THE SHAFT.



Walbro

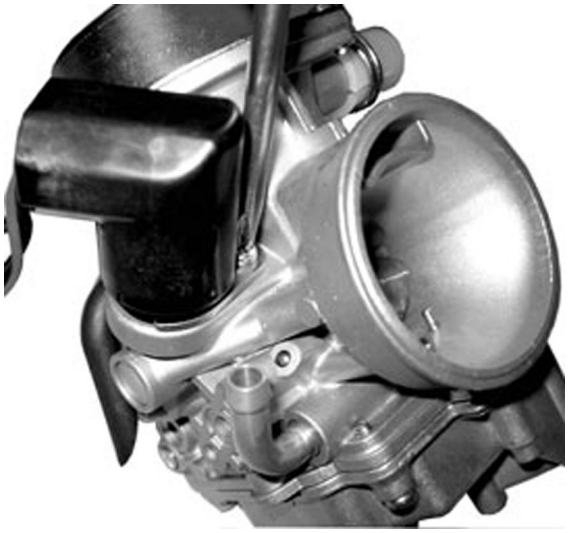
- To disconnect the carburettor from the engine, it is necessary to move the air filter and remove the gas control transmission, the automatic starter connection, the clamps fixing the carburettor to the filter box and to the intake manifold, the pipe feeding air to the membrane, and the intake union.
- Extract the carburettor and turn it to remove the screw with the water union and relevant pipes.

N.B.

THIS OPERATION IS REQUIRED TO PREVENT LOSING THE SPRAY NOZZLE DURING THE CARBURETTOR CLEANING OPERATIONS. IF THE SPRAY NOZZLE IS FORCED INTO ITS SEAT, DO

NOT REMOVE IT TO PREVENT DAMAGING IT.

Remove the guard, the bracket and the starter by releasing the screw shown in the figure.

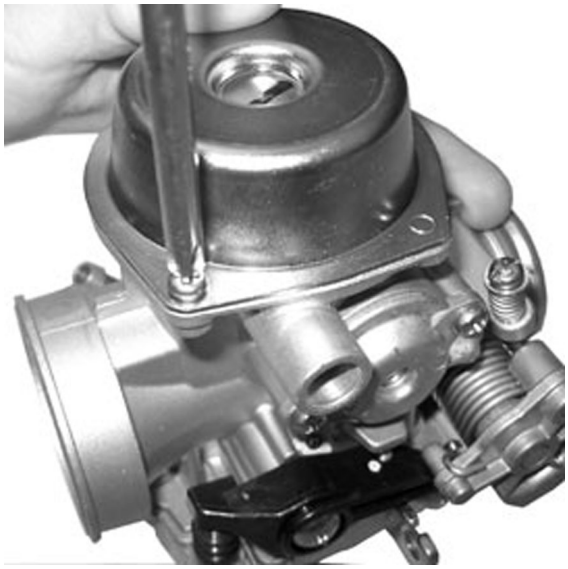


Remove the clamp and the cap with the membrane chamber aeration filter.

Remove the 4 fixing screws shown in the figure and the vacuum chamber cover.

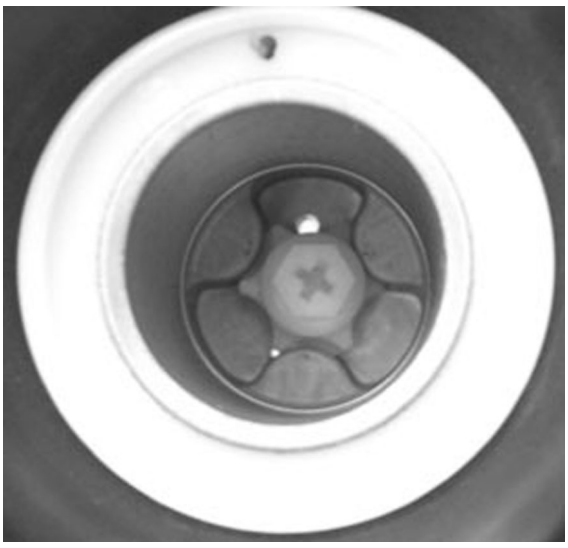
N.B.

DURING THE COVER REMOVAL, BE CAREFUL TO THE SUDDEN PROJECTION OF THE SPRING.



Remove the vacuum valve with the membrane.

Loosen the coupling by 1/8 turn and remove it, remove the spring and the vacuum valve pin.



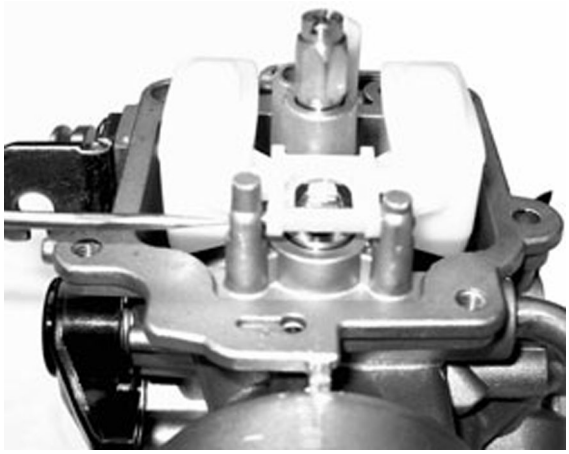
Remove the 4 screws shown in the figure.

Remove the basin with the pickup pump, control and gasket.

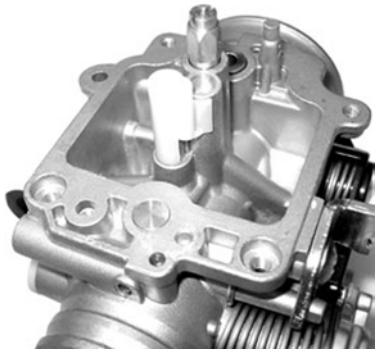
Remove the pickup pump with ring nut, the casing, the O-Ring and the spring from the basin as shown in the figure.

- Suitably support the carburettor and remove the float pin by a hammer from the gas control side.
- Remove the float and the pin.

Remove the cap conveying the fuel to the starter nozzle as shown in the figure.



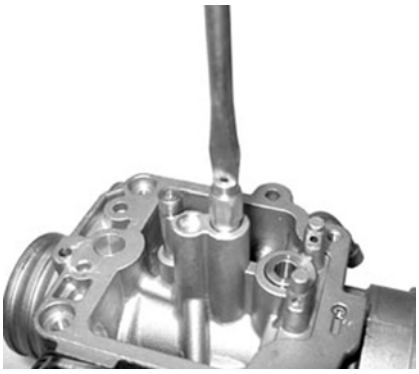
- Remove the maximum nozzle.
- Remove the emulsifier.



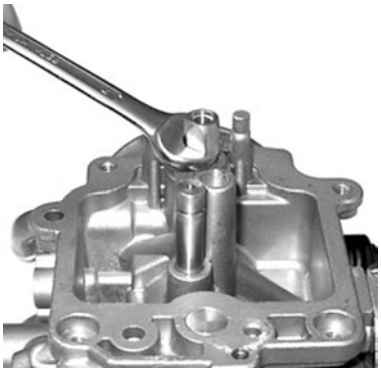
Remove the spray nozzle.

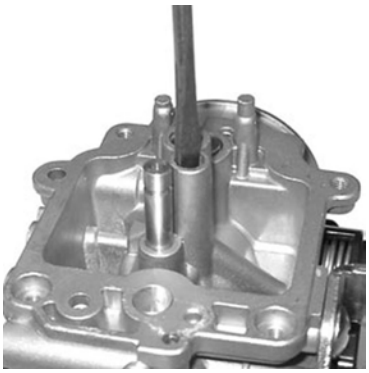
N.B.

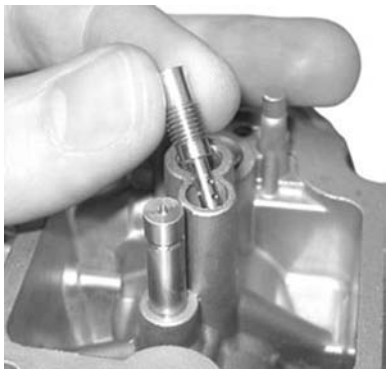
THIS OPERATION IS REQUIRED TO PREVENT LOSING THE SPRAY NOZZLE DURING THE CARBURETTOR CLEANING OPERATIONS. IF THE SPRAY NOZZLE IS FORCED INTO ITS SEAT, DO NOT REMOVE IT TO PREVENT DAMAGING IT.

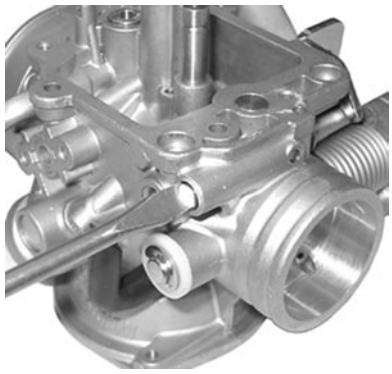


Remove the minimum nozzle.









- Remove the minimum flow screw with the O-Ring, washer and spring.
- Remove the 2 fixing screws, the cover, the spring and the cut-off device membrane.

CAUTION

DO NOT REMOVE THE COMPONENTS FIXED INTO THE CARBURETTOR BODY, SUCH AS: FUEL FEEDING DUCT, PIN SEAT, STARTER NOZZLE, PICKUP NOZZLE AND PIT CAP, MINIMUM AND MAXIMUM AIR CALIBRATOR, THROTTLE VALVE CONTROL SHAFT. DO NOT REMOVE THE SCREWS FIXING THE THROTTLE TO THE SHAFT. THE FIX-ING SCREWS ARE CAULKED AFTER ASSEMBLY AND THEIR REMOVAL DAMAGES THE SHAFT.

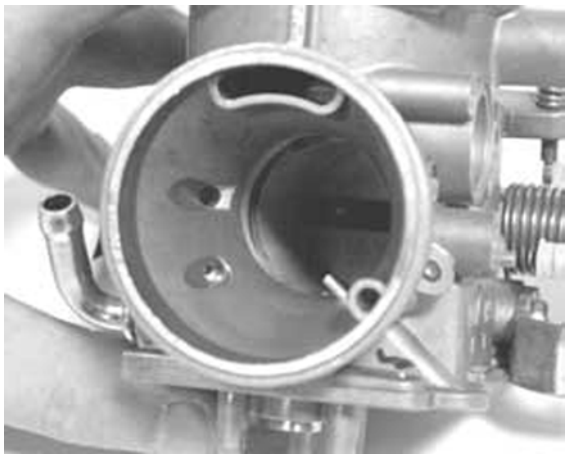
Refitting the carburettor

Kehin

- Before proceeding to reassembly, carefully clean the carburettor body using fuel and com-pressed air.
- Be especially careful to the fuel inlet duct and the pin seat.

- For the maximum circuit, check the air calibra-

tion shown in the figure.



- For the minimum circuit, check the correct cleaning of the following points: air calibration, outlet section controlled by the flow screw, progression holes close to the throttle valve.

- For the starter circuit, carefully blow the nozzle connection duct since the nozzle support hides further internal calibrations that are not accessible.
- Carefully blow the pickup nozzle.

N.B.

ITS OUTLET SECTION IS VERY SMALL AND FACES THE THROTTLE VALVE. A WRONG ORIENTATION OF THE NOZZLE CAUSES A POOR SPRAYING.

- Check that on the carburettor body there are 5 closing balls of the processing ducts.
- Check that the matching surfaces with the basin and the membrane exhibit no dents.
- Check that the vacuum valve seat is not deformed.
- Check that the throttle valve and the shaft exhibit no abnormal wear.
- Check that the pin seat exhibits no abnormal wear.
- In case of anomalies, replace the carburettor.
- Check that the pickup pump rocker return spring is not slackened.

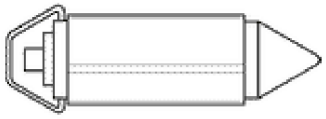
N.B.

TO PREVENT DAMAGES, DO NOT INSERT METAL OBJECTS INTO THE CALIBRATED SECTIONS.

- Wash and blow the minimum nozzle and then replace it.

- Wash and blow the components of the maximum, emulsifier and nozzle circuit.
- Insert the spray nozzle into the carburettor body with the shorter cylindrical part facing the emulsifier.
- Install the emulsifier making sure that the spray nozzle is properly inserted, then lock it.
- Install the maximum nozzle.

- Check that the conical pin exhibits no wear on the pin sealing surface and on the return spring.
- In case of wear, replace the pin.



- Check that the float exhibits no wear on the pin seat or on the plate in contact with the pin, or fuel infiltrations.
- In case of anomalies, replace.
- Insert the float with the pin on the fuel feeding side.

N.B.

BE CAREFUL TO THE PROPER INSERTION OF THE RETURN SPRING ON THE FLOAT PLATE.

- Remove the basin drainage screw and wash

and blow the basin, be especially careful to the cleaning of the pickup pump ducts.

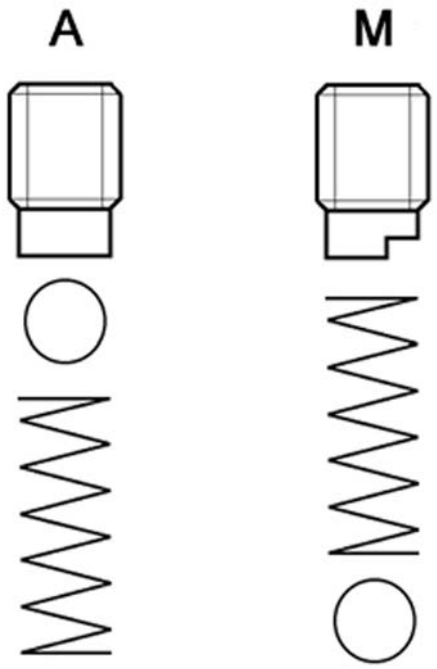
- Repeatedly actuate the pickup pump piston and blow with compressed air.
- Replace the pickup pump valves in a sequence:

INTAKE VALVE (A)

- Spring
- Sphere
- Nozzle

DELIVERY VALVE (M)

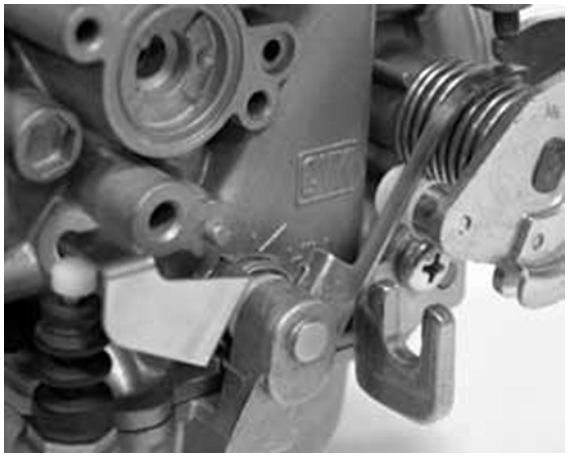
- Spring
- Nozzle
- Sphere



N.B.

THE DELIVERY VALVE NOZZLE IS PROVIDED WITH A MILLING.

- Check the screw seal by pouring a small amount of fuel into the basin.
- Install a new gasket on the basin.
- Install the basin on the carburettor body and tighten the 4 screws.
- Check that the control roller is free to rotate into its seat.



N.B.

CHECK THE PROPER INSERTION OF THE GASKET.

N.B.

AVOID ANY DEFORMATION OF THE PICKUP PUMP CONTROL ROCKER.

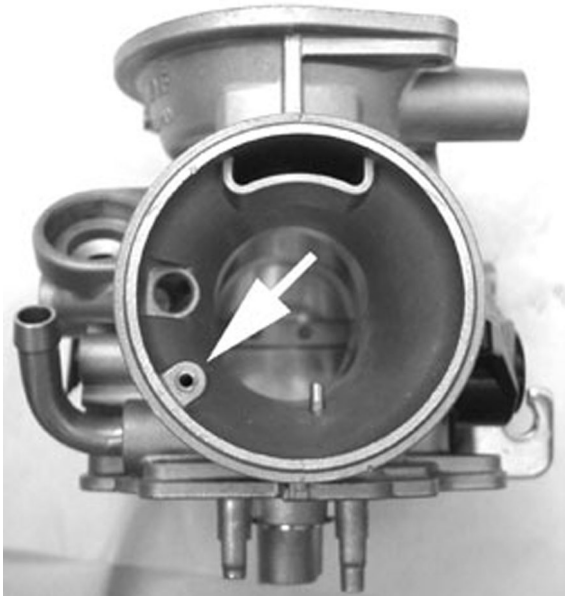
- Wash and blow the flow screw.
- Check that the screw is free from deformation and/or oxidation.
- Assemble the spring on the screw.

- Tighten the flow screw on the carburettor body.

- The final position of the screw must be defined by the exhaust gas analysis.
- Prepare the carburettor for adjustment with the screw loosened by 2 turns from the closed position.

Walbro

- Before proceeding to reassembly, carefully clean the carburettor body using fuel and compressed air.
- Be especially careful to the fuel inlet duct and the pin seat.



- For the maximum circuit, check the air calibration shown in the figure.
- Carefully clean the air holes shown in the figure.

- For the minimum circuit, check the correct cleaning of the following points: air calibration, outlet section controlled by the flow screw, progression holes close to the throttle valve.

N.B.

THE MINIMUM AIR IS CONTROLLED BY TWO CALIBRATIONS. THAT OF THE CUT-OFF IS DIRECTLY OBTAINED IN THE CARBURETTOR BODY.

- For the starter circuit, carefully blow the nozzle connection duct since the nozzle support hides further internal calibrations that are not accessible.
- Carefully blow the pickup nozzle.

N.B.

ITS OUTLET SECTION IS VERY SMALL AND FACES THE THROTTLE VALVE. A WRONG ORIENTATION OF THE NOZZLE CAUSES A POOR SPRAYING.

- Check that on the carburettor body there are 5 closing balls of the processing ducts.
- Check that the matching surfaces with the basin and the membrane exhibit no dents.
- Check that the vacuum valve seat is not deformed.
- Check that the throttle valve and the shaft exhibit no abnormal wear.
- Check that the pin seat exhibits no abnormal wear.
- In case of anomalies, replace the carburettor.

N.B.

TO PREVENT DAMAGES, DO NOT INSERT METAL OBJECTS INTO THE CALIBRATED SECTIONS.

- Wash and blow the minimum nozzle and then replace it.
- Wash and blow the components of the maximum, emulsifier and nozzle circuit.
- Insert the spray nozzle into the carburettor body with the shorter cylindrical part facing the emulsifier.
- Install the emulsifier making sure that the spray nozzle is properly inserted, then lock it.
- Install the maximum nozzle.
- Check that the conical pin exhibits no wear on the pin sealing surface and on the return spring.
- In case of wear, replace the pin.

- Check that the float exhibits no wear on the pin seat or on the plate in contact with the pin, or fuel infiltrations.
- In case of anomalies, replace.
- Install the float with the pin inserting the pin on the fuel feeding side.

N.B.

BE CAREFUL TO THE PROPER INSERTION OF THE RETURN SPRING ON THE FLOAT PLATE.

Level check

Kehin

- Place the carburettor tilted as shown in the figure.

- Check that the reference on the float is parallel to the basin matching surface.
- If the position is different, change the orientation of the metal pin control plate to obtain the position described above.

Walbro

- Check that the float matching surface is parallel to the basin surface with carburettor in upturned position.
- If the position is different, change the orientation of the metal pin control plate to obtain the position described above.
- When deforming the plate, check that it remains parallel to the floating pin.

N.B.

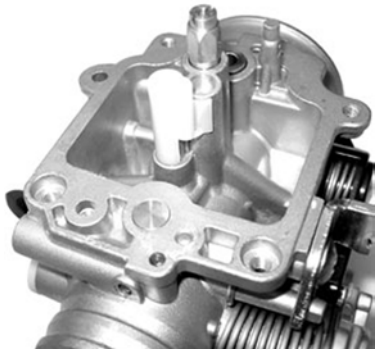
WITH THE CARBURETTOR IN UPTURNED POSITION, THE FLOAT WEIGHT MUST NOT OVERCOME THE THRUST OF THE CONICAL PIN SPRING. IF NOT SO, CHECK THAT THE FLOAT IS NOT BURDENED WITH INFILTRATIONS OF FUEL, AND REPLACE THE FLOAT OR THE CONICAL PIN, IF REQUIRED.

- Wash and carefully blow the fuel conveying cap

and insert it on the starter nozzle.

N.B.

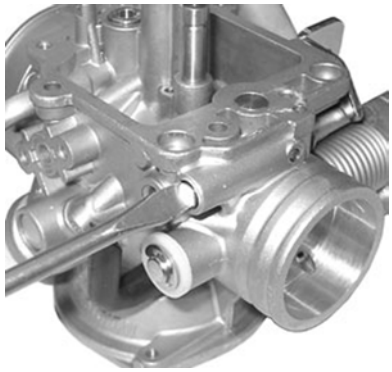
FAILURE TO INSTALL THIS PART CAUSES A WORSE COLD START CHARACTERISTIC, SINCE THE STARTER NOZZLE WITHDRAWS OLD FUEL FROM THE BASIN BOTTOM.



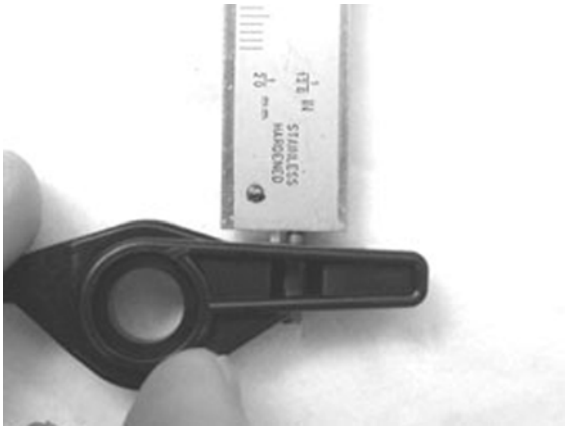
- Remove the basin drainage screw and wash and blow the basin, be especially careful to the cleaning of the pickup pump intake and delivery valve.
- Since the valves are unidirectional, carefully blow with compressed air in the intake valve from the basin internal side and into the pump piston seat for the delivery valve.
- Check that the pickup pump piston and relevant seat into the basin are free from wear.
- In case of wear, replace the defective parts.
- Check that the pickup pump piston contrast spring is not worn.
- Install a new O-Ring and a new bellows gasket, replace the piston unit on the basin.
- Install a new O-Ring on the basin drainage screw and tighten the screw.

- Check the screw seal by pouring a small amount of fuel into the basin.
- Install a new gasket on the basin.
- Install the basin on the carburettor body and tighten the 4 screws.

- Wash and blow the flow screw, install a new O-Ring.
- Pre-assemble the components on the screw in the following order: spring, washer, O-Ring.
- Tighten the flow screw on the carburettor body.
- The final position of the screw must be defined by the exhaust gas analysis.
- Prepare the carburettor for adjustment with the screw loosened by 3 turns from the closed position.



- Check that the pickup pump control rocker is free from abnormal wear.
- Check that the rocker travel end screw protrudes by 3.2 mm.



- Check that the rocker return spring is not slackened.
- Pre-assemble the spring and the rocker as

shown in the figure.

- Install the rocker on the carburettor keeping the throttle valve open.
- Tighten the rocker fixing screw.
- Make sure that the gear works properly.

Inspecting the valve and needle

Kehin

- Check that the vacuum valve conical pin is free from wear.
- Check that the vacuum valve exhibits no scratches on the outside surfaces.
- Check that the vacuum feeding hole is not clogged.
- Check that the membrane is not broken or hardened, if not so, replace the entire valve.
- Insert the conical pin into the vacuum valve seat.
- Replace the vacuum gas valve on the carburettor body being careful to insert the pin into the spray nozzle.

N.B.

THE VALVE CAN BE INSERTED IN A SINGLE POSITION ONLY.

- Replace the spring with the pin lock.
- Replace the vacuum chamber cover checking the proper positioning of the spring into the hous-

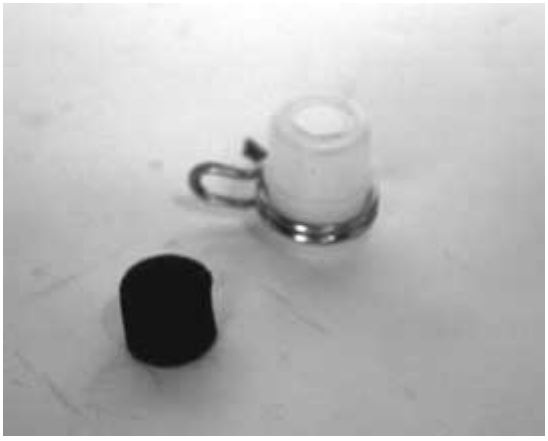
ing on the cover.

- Tighten the screws at the prescribed torque.

Locking torques (N*m)

Vacuum chamber cover screws: XX N m

- Wash and blow the ambient pressure inlet filter sponge.



- Replace the filter and its clamp.

- Wash and blow the starter support.

- Install a new gasket on the carburettor body and tighten the 2 fixing screws.

Walbro

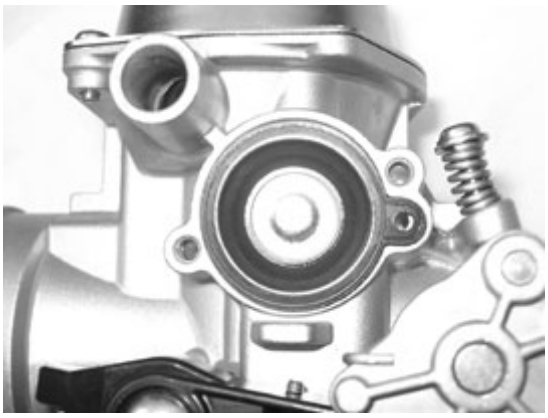
- Check that the pin exhibits no wear and that the lock is in the third notch out of 3.
- Check that the vacuum valve exhibits no scratches on the outside diameter.
- Check that the 2 vacuum feeding hole are not clogged.

N.B.

THE 2 HOLES HAVE A DIFFERENT DIAMETER.

- Check that the membrane is not broken or hardened, if not so, replace it.
- Replace the conical pin on the vacuum valve.
- Check the correct positioning of the spring on the pin and the snapping into the relevant seat.
- Install the coupling by turning it by 1/8 turn.

- Replace the vacuum gas valve on the carburet-tor body being careful to insert the pin into the spray nozzle.



- Time the vacuum valve rotation inserting the membrane tail into the relevant seat.
When the membrane is properly assembled to the valve, the main vacuum feeding hole is in axis with the diffuser, on the throttle valve side.
- Replace the spring on the valve.
- Replace the vacuum chamber cover matching the reference with the membrane orientation reference.
- Tighten the screws at the prescribed torque.
- Check the cut-off valve functionality. Check that the membrane is not broken or hardened. Check the free length of the spring.

Characteristic

Walbro: Standard length

24 mm

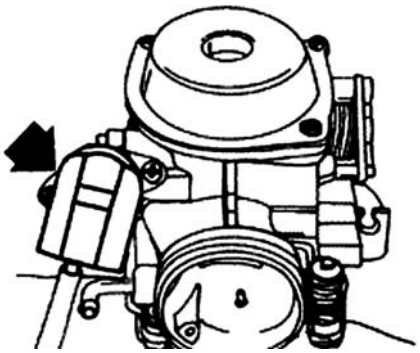
- Replace the membrane with the metal pin positioned on the valve.
- Replace the spring and the cover. The cover must have the vacuum inlet facing upwards

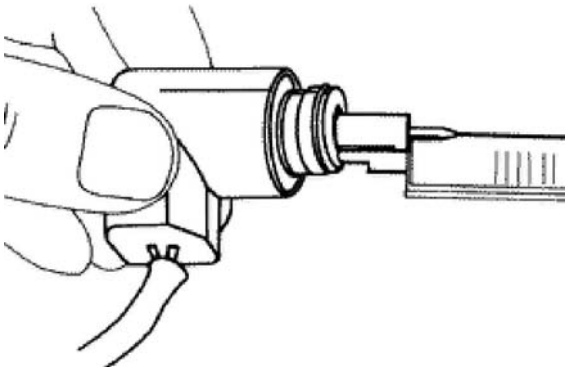
Inspecting the automatic choke device

- Check that the automatic starter piston exhibits no scratches or oxidation.
- Check that the piston slides freely into the seat.
- Check that the piston sealing gasket exhibits no deformations.
- The starter must be more or less inserted according to the ambient temperature.
- Measure the projection of the piston as shown in the figure, and check the corresponding value.
- Ensure that the starter settles at ambient temperature.
- Install the starter on the carburettor checking the proper positioning of the O-Ring, insert the plate with the knurling resting against the starter, tight-

en the 2 fixing screws.

- Orientate the starter as in the figure.
- Install the safety casing.
- The actual heating time depends on the ambient temperature.
- If you detect projections, resistance or times differing from those prescribed, replace the starter.
- The starter should gradually disconnect by the electric heating.
- Check the starter resistance when settled at ambient temperature.
- Using a 12V battery, power the automatic starter and check that the pèiston reaches the maximum protrusion.





Characteristic

Automatic starter check: projection value

12.5 ÷ 13 mm at about 20°C

Automatic starter check: Maximum projection

18,5 ÷ 19 mm

Automatic starter check: Max time

5 min

Electric characteristic

Automatic starter check: Resistance

about 30 Ω

Kehin

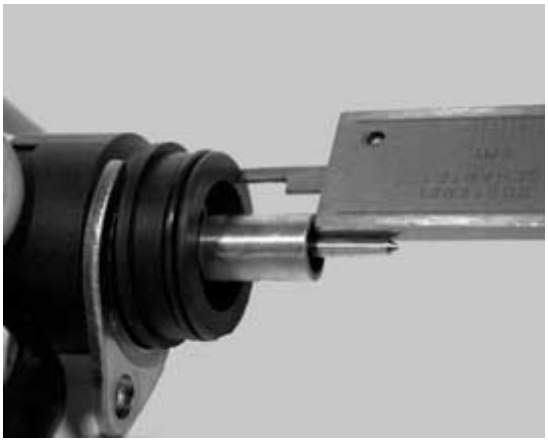
- Check that the automatic starter piston exhibits no scratches or oxidation.
- Check that the piston slides freely into the seat.
- Check that the piston sealing gasket exhibits no deformations.
- The starter must be more or less inserted according to the ambient temperature.
- Measure the projection of the piston as shown in

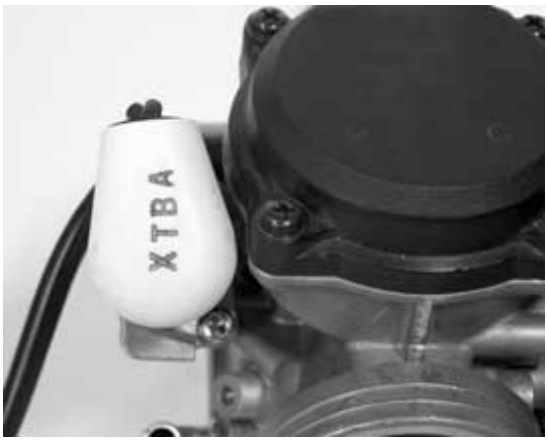
the figure, and check the corresponding value.

- Ensure that the starter settles at ambient temperature.
- The starter should gradually disconnect by the electric heating.
- Check the starter resistance when settled at ambient temperature.
- Using a 12V battery, power the automatic starter and check that the piston reaches the maximum protrusion.
- The actual heating time depends on the ambient temperature.
- If you detect projections, resistance or times differing from those prescribed, replace the complete starter.
- Install the starter on the carburettor checking the proper positioning of the O-Ring, insert the plate with the knurling resting against the starter, tighten the fixing screw.
- Orientate the starter as in the figure.
- Install the safety casing.

N.B.

TO PERFORM THIS CHECK, BE CAREFUL NOT TO GENERATE ANY SHORT CIRCUITS. TO THIS PURPOSE, USE A CABLE WITH SUITABLE TERMINAL FOR CONNECTING TO THE STARTER.





Characteristic

Automatic starter check Kehin

XX ÷ XX mm at about 20°C

Automatic starter check Kehin maximum projection

XXX ÷ XXX mm

Automatic starter check Kehin max time

5 min

Walbro

- Check that the automatic starter piston exhibits no scratches or oxidation.
- Check that the piston slides freely into the seat.
- Check that the piston sealing gasket exhibits no deformations.
- The starter must be more or less inserted according to the ambient temperature.
- Measure the projection of the piston as shown in the figure, and check the corresponding value.
- Ensure that the starter settles at ambient temperature.
- The starter should gradually disconnect by the electric heating.
- Check the starter resistance when settled at ambient temperature (20 ÷ 25 °C).
- Using a 12V battery, power the automatic starter and check that the piston reaches the maximum protrusion.
- The actual heating time depends on the ambient temperature.
- If you detect projections, resistance or times differing from those prescribed, replace the starter.

Characteristic

Automatic starter check: projection value

12.5 ÷ 13 mm at about 20°C

Automatic starter check Walbro maximum projection

18.5 ÷ 19 mm

Automatic starter check Walbro max time

5 min

Electric characteristic

Resistance Walbro

about 40 Ω

INDEX OF TOPICS

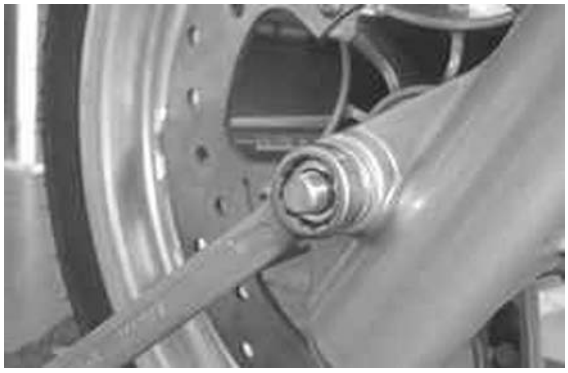
SUSPENSIONS	SUSP

Front

Removing the front wheel

- Remove the front calliper.

- Loosen the axle locknut.



- Loosen the two axle safety screws on the leg, on the brake calliper side.

- Pull out the axle.

See also

Removal

Front wheel hub overhaul

Check that the wheel bearings do not show signs of wear.

If it is necessary, change the wheel bearings as follows:

- Remove the plastic cover on the tone wheel side to avoid damage by loosening the 5 retaining screws.

- Remove the two bearings on the odometer drive

side using the pliers 14 or 34 and the bell detail 9.

- Remove the internal spacer.

*** It is possible to use one of the two tools alternately.**

- Support the front wheel with two wooden shims that make it possible to avoid scratching in the case of contact with the rim.
- Insert the punch (consisting of adaptor handle, 15 mm adaptor and guide) from the odometer drive side to permit the removal of the brake disc side bearing and the spacer bushing.

Specific tooling

020376Y Handle for adaptors

020456Y diameter 24 mm adaptor

020412Y 15 mm guide

- Heat the bearing seat on the side the brake disc with the heat gun.

- Insert the bearing using the punch consisting of adaptor handle, 42x47 mm adaptor and 15 mm guide, and drive it up to the stop.

- Reinsert the spacer bushing on the brake disc side using the appropriate tool and take it to the stop.

Specific tooling

020376Y Handle for adaptors

020359Y 42 x 47 mm adaptor

020412Y 15 mm guide

020201Y Spacer bushing driving tube

- Turn over the wheel and insert the internal spacer with the part fitted with the Seeger ring facing the bearing on the brake disc side installed previously.

- Heat the bearing seat on the odometer drive side with the heat gun.

- Insert the two bearings using the punch consisting of adaptor handle, 32x35 mm adaptor and 15 mm guide, and drive it up to the stop.

Specific tooling

020376Y Handle for adaptors

020357Y 32 x 35 mm adaptor

020412Y 15 mm guide

- Refit the cap and tighten the five clamping screws.

Refitting the front wheel

- Grease the wheel axle, then install it from the tone wheel side and install the tone wheel proper.
- Tighten the wheel axle nut to the prescribed torque.

N.B.

TAKE CARE NOT TO DAMAGE THE ODOMETER DRIVE.
FOR THE SAKE OF SAFETY, OFFSET THE INTERNAL STOP FROM THE STOP OF THE TONE WHEEL BY 90°.

- Tighten the two safety screw on the leg to the prescribed torque.

Locking torques (N*m)

Front wheel axle nut 45 - 50 Safety screw on leg 6 - 7

Handlebar

Removal

- Remove the rear handlebar cover.
- Remove the handlebar fixing pin from the head-stock.
- Remove the handlebar and place it on the rear cover of the front shield.

See also

Rear handlebar cover

Refitting

- Refit the handlebar on the steering tube being careful to make the throat machined on the handle-bar correspond with that on the steering tube, as shown in the figure.
- Tighten the screw fixing the handlebar to the steering column to the prescribed torque.

Locking torques (N*m)

Handlebar clamping screw*	**45 ÷ 50**

(*) Lubricate the nuts with engine oil before in-stallation

Front fork

Removal

- Remove the front wheel
- Remove the handlebar.
- Using the appropriate tool, loosen and remove the upper ring nut, the distancing washer, the counter ring nut and the spacer ring.
- Extract the fork.

N.B.

TAKE CARE TO SUPPORT THE FORK SO AS TO PREVENT IT FROM COMING OFF ABRUPTLY

Specific tooling

020055Y Key for steering column ring-nut

See also

Removing the front wheel
Removal

Overhaul

- Check that the roller bearing does not show signs of wear or pricking.

If replacement is necessary, do the following: - Support the fork in a clamp. - Insert the contrast washer in the upper end of the steering tube.

N.B.

ONLY REMOVE THE UPPER BALL BEARING IF YOU REALLY NEED TO.

- Insert the appropriate tool as shown in the figure.

- Insert the retention clip of the two half-rings.

- Using the 19 mm hexagonal wrench, remove the roller bearing.

Specific tooling

020458Y Puller for lower bearing on steering column

- Insert a new washer and dust guard in the steering tube. - Insert a new roller bearing in the roller tube. - Using an appropriate tool and with the aid

of a mallet insert the dust guard and bearing and take it to the stop.

Specific tooling

006029Y Punch for fitting the seat of the fifth wheel on the steering column

- With the 10 mm hexagonal wrench for internal parts loosen the upper stem closing cap.

- Loosen the stem support clamp and remove the leg and stem.

- Remove the first spring consisting of 15 windings. - Remove the spring support plate. - Remove the second spring consisting of 21 windings. - Drain the oil. - Separate the stem from the leg by removing the screws with copper washer shown in the figure. To prevent the rotation of the pumping insert a 12 mm hexagonal wrench for internal parts in the stem.

- Remove the dust ring with a screwdriver as shown in the figure.

- Remove the oil guard safety block with a screw-driver. - Using the appropriate special tool, remove the oil seal. - Insert the tie rod complete with cable into the oil guard. - Insert the two half rings for diameter 35 mm stems.

- Keeping the tie rod vertical, insert the diameter 35 mm stem bell housing. - Insert the nut in the threading and extract the oil guard

Specific tooling

020487Y Fork oil-seal extractor

- Check the length of the springs.

SPRING LENGTH CHECK

Specification	Desc./Quantity
Standard length	15 winding spring: 116.3 + 2-1 mm
Standard length	21 winding spring: 175.7 + 2-1 mm
Allowable limit after use:	15 winding spring: 114.3 mm
Allowable limit after use:	21 winding spring: 173.7 mm

Check there are no signs of wear or seizing up between the stem and the leg. If there are, replace the damaged part.

Characteristic

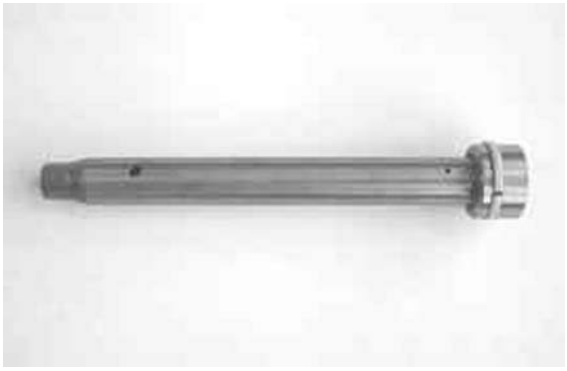
Maximum leg diameter

35.10 mm

Minimum stem diameter

34.90 mm

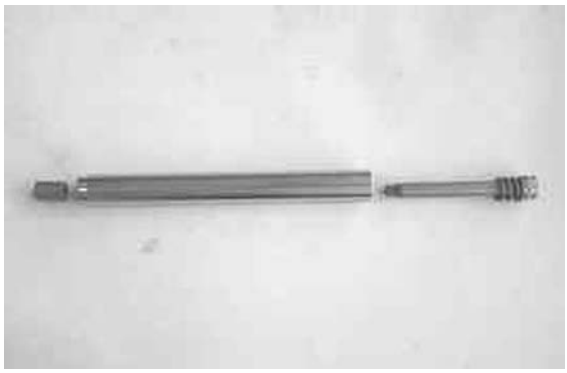
Check that the oil holes on the pumping element are not clogged. - Check that the O-ring exhibits shows no sign of damage.



- Insert a new oil guard with the special adaptor handle and take it to the stop. - Insert the safety clip. - Insert a new dust guard.

- Insert the contrast spring in the pumping element. - Insert the pumping element inside the stem. - Insert the pumping element guide bushing

at the lower stem end. - Insert the stem in the leg being careful not to let the stem guide bushing come out.



- Inset and screw up the copper washer to the prescribed torque. To avoid the rotation of the pumping element insert a 12 mm hexagonal wrench for internals. - Put 102 ± 1 cc of oil in the stem.

Recommended products

SELENIA FORK0 10 W Oil for front fork

Hydraulic oil SAE 10 W

- Insert the 21 winding springs, the support plate with the chamfer facing downwards and then the 15 winding spring.

- Insert the stem in the fork clamp. - Do up the clamp once to allow the stem closure upper cap to be tightened. . - Ensure the good condition of the cap seal then tighten the cap on the stem to the prescribed torque.

- Loosen the fork clamp screws and ensure the stem closure cap is fitted properly on the clamp. -

Tighten the clamp screws to the prescribed torque.

Specific tooling

020376Y Handle for adaptors

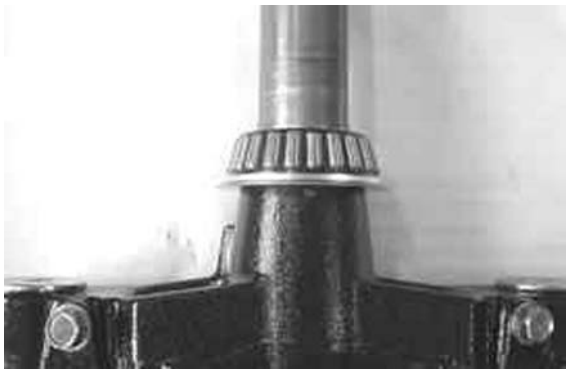
020359Y 42 x 47 mm adaptor

Locking torques (N*m)

Fork clamp screws 20 - 25 Upper stem cap 15 ÷ 30 Lower screw with copper washer 25 - 35

Refitting

- Grease using lithium soap grease on the roller bearings.



Recommended products

TUTELA ZETA 2 Grease for steering bearings, pin seats and swinging arm

Soap-based lithium and zinc oxide NLG12 grease

- Insert the fork in the headstock.
- Insert the spacer ring.
- Using an appropriate tool do up the first ring nut in the steering tube (upper steering ball bearing). Tighten to the prescribed torque.
- Fit the distancing washer.
- Using the special tool, tighten the second locking ring nut in the steering tube to the prescribed torque.

Specific tooling

020055Y Key for steering column ring-nut

Locking torques (N*m)

Lower steering ring nut 10 ÷ 13 then loosen by 90° Upper steering ring nut 30 ÷ 36

Steering bearing

Removal

- Remove the fork
- Check that the upper ball bearing and the seat of the lower roller bearings do not show signs of wear or pricking.

If replacement is necessary, do the following:

- Using a punch to remove the bearings, insert it from the bottom and remove the ball bearing above the headstock. Then remove the lower seat of the roller bearing by inserting the punch from the top of the headstock.

N.B.

ONLY REMOVE THE UPPER BALL BEARING IF YOU REALLY NEED TO.

Specific tooling

020004Y Puller for removing the fifth wheel from the headstock

See also

Removal

Refitting

Using the appropriate tool, refit the upper ball bearing and the seat of the lower roller bearings on the headstock as described below:

- Place a new ball bearing on the headstock and a roller bearing seat on the lower part. - Insert the tie rod screw of the appropriate tool fitted out with the adaptors for planting the bearing and seat it in the headstock as in the photograph. - Using two 24 mm wrenches, do the seat and the bearing right up.

N.B.

ALWAYS USE A NEW BEARING AND A NEW HOUSING.

Specific tooling

001330Y Tool for fitting steering seats

Rear

Removing the rear wheel

- Remove the silencer mounting bracket.
- Remove the five screws shown in the picture.

Refitting the rear wheel

- Carry out the operations in the reverse order to the removal, observing the prescribed tightening torques.

Locking torques (N*m)

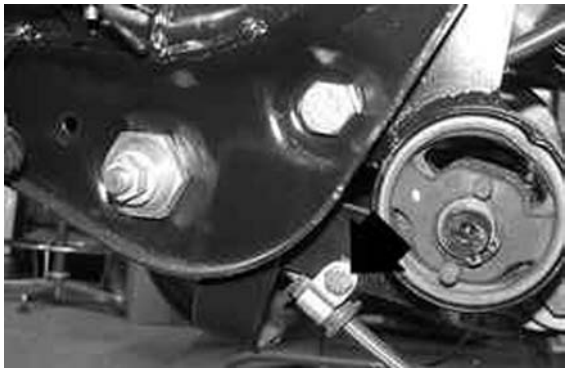
Retaining screw for wheel rim to hub 34 ÷ 38

Swing-arm

Removal

- Place the scooter on its centre stand; - Support the engine adequately; - Loosen the nut shown in the figure and pull out the spindle from the left-hand side.

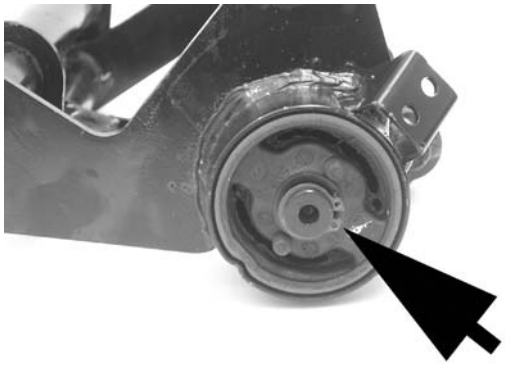
- Loosen the nut and lock nut on the left-hand side of the scooter (see figure) and unscrew the spindle from the opposite side. - Remove the retaining screw of the rear brake pipe shown in the figure.



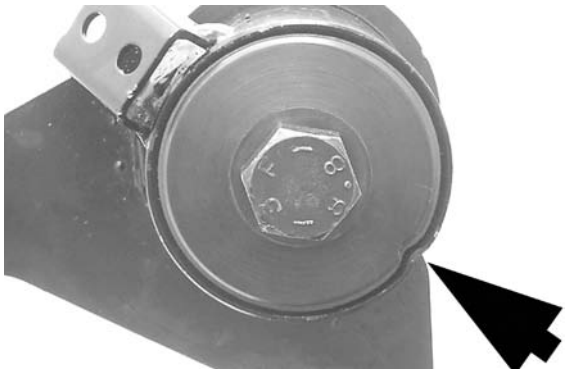
- Loosen the nut on the inside of the frame from the left-hand side (see figure) and remove the relevant spindle; - Remove the swinging arm.

Overhaul

- Check that the silent bloc is not damaged. If it is, replace it.
- Remove the Seeger ring shown in the photograph



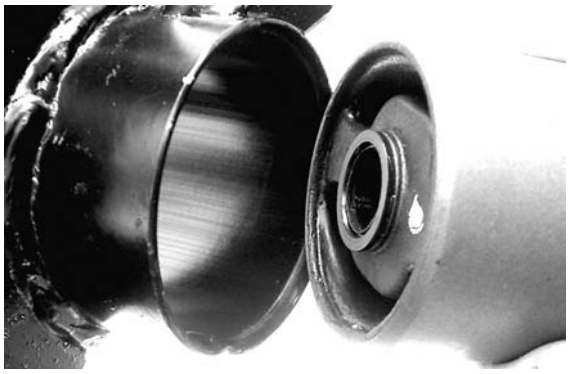
- Remove the full silent bloc bracket
- Hold the full silent bloc bracket in the clamp
- Using the appropriate tool, remove the silent bloc from the bracket from the side corresponding to the inside of the scooter . This is to guarantee the tool is centred properly on the support



Specific tooling

020271Y Tool for removing-fitting silent bloc

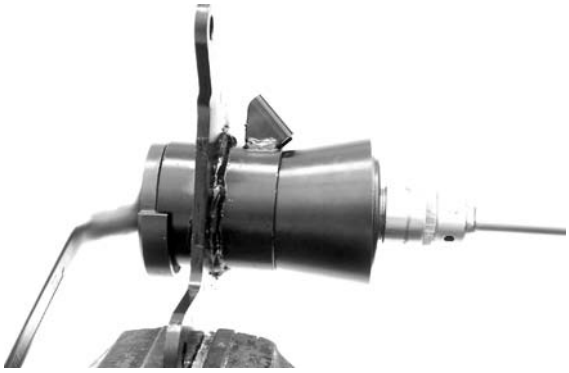
- Install a new silent bloc, making sure it aligns properly with the reference tooth.
- Fit the silent blocs, making sure the chamfered part of the silent bloc matches the chamfered part of the bracket



- Using the appropriate tool, fit the silent bloc as indicated in the photo

Specific tooling

020271Y Tool for removing-fitting silent bloc



- Check there is no sticking in the movement of the connection of the swinging arm on the engine side to the swinging arm on the frame side.
- Check the axial clearance between the two swinging arms using a feeler gauge

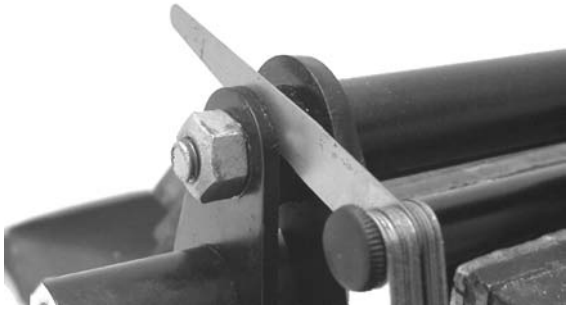
Characteristic

Allowable limit after use:

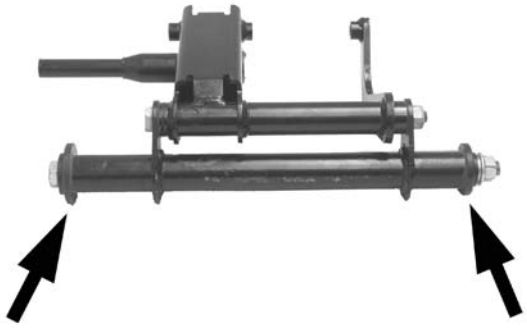
1 mm

Standard clearance

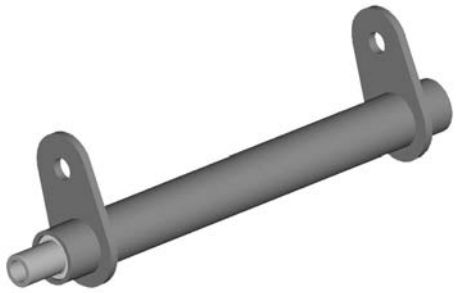
0.40 ÷ 0.70 mm



- In order to check the clearance of the swinging arm on the frame side, prepare a retainer using the fixing pin of the swinging arm on the frame and two rings from the special tool 020229Y. Alternatively, use two washers with inside diameter of 12 mm for pins, outside diameter min. 30 mm and thickness min. 4 mm.



- Separate the swinging arm on the engine side from the scooter side arm.
- Remove the internal spacer shown in the photograph



- Using a suitable pin remove the roller casings as shown in the photographs

- Using an appropriate tool plant new roller casings, being careful to position the bearings with the O-rings facing outwards

Specific tooling

020115Y Diameter 18 punch

020244Y 15 mm diameter punch

SERVICE OF THE SWINGING ARM

Specification	Desc./Quantity
Length of the internal swinging arm spacer on the frame side	**228** -0.2/-0.4mm
Length of the internal swinging arm spacer on the engine side	**183** 0/-0.2mm
Length of the swinging arm tube on the engine side	**182.5** -0.1/-0.3mm
Length of the swinging arm tube on the frame side	**227.1**+0.2/0mm

- Lubricate the roller bearing housings with grease
- Insert the spacers
- Assemble the two arms with the relative bolt in the position shown in the photograph
- Adjust the bolt as shown in the photograph
- Position the frame side swinging arm with the most protruding part pointing towards the silent block side as shown in the photograph

Recommended products

TUTELA ZETA 2 Grease for steering bearings and spindle seats

NLG12 lithium soap and zinc oxide swinging arm grease

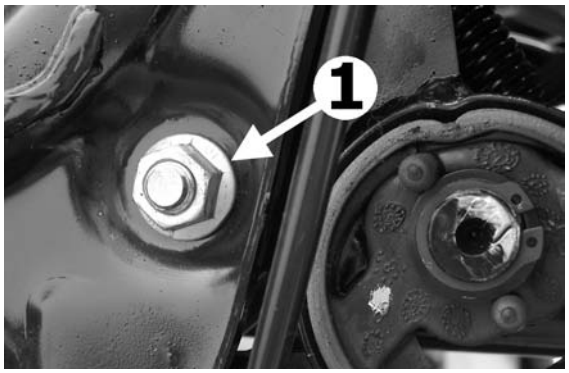
Refitting

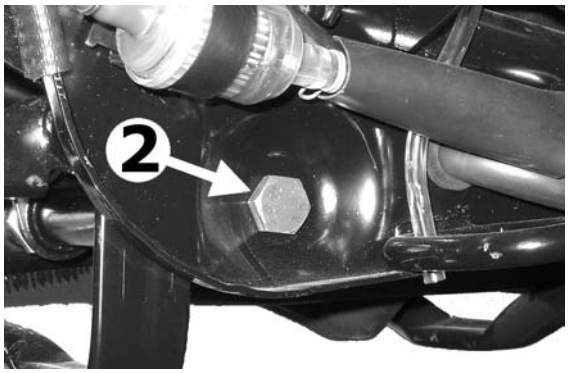
For correct installation of the swinging arm on the

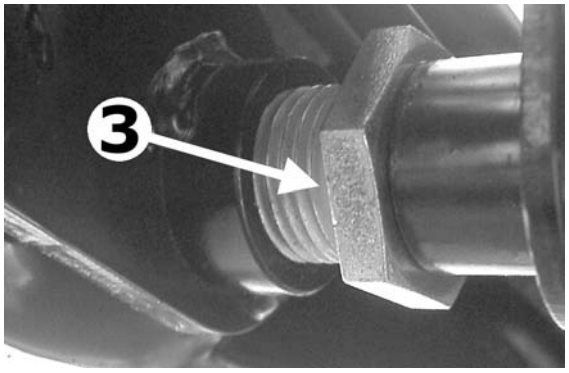
scooter, proceed as follows:

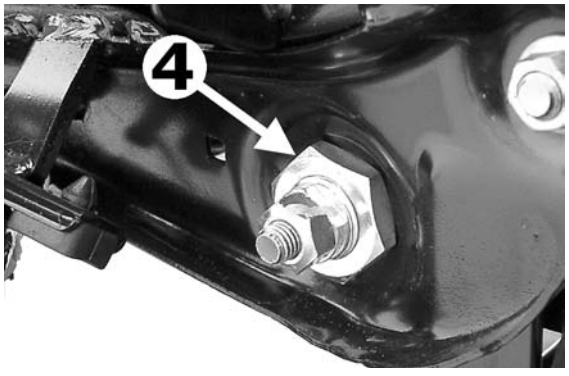
Position the silent bloc support bracket with part **3** inserted and lightly tighten part **1** Position the swinging arm, inserting part **2** Tighten part **3** to the prescribed torque Screw on and tighten part **4** to the prescribed torque Screw on and tighten part **5** to the prescribed torque Tighten part **1** to the prescribed torque

Insert the swinging arm - engine bolt and tighten to the prescribed torque









SWINGING ARM FITTING

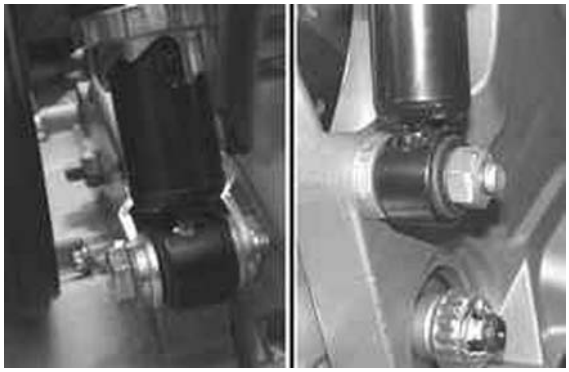
Name	Torque in Nm
Part 1	64 ÷ 72 Nm
Part 3	5 - 7 Nm
Part 4	90 ÷ 110 Nm
Part 5	64 ÷ 72 Nm
Engine-swinging arm bolt	64 - 72 Nm

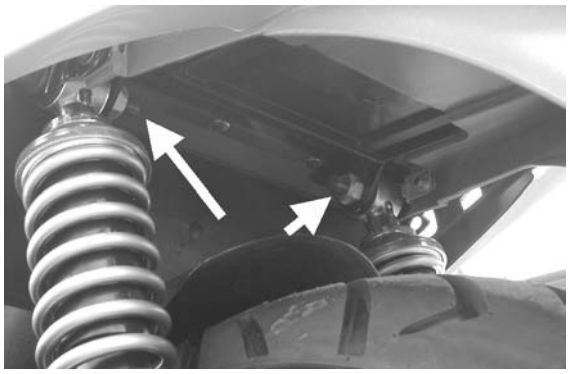
Shock absorbers

Removal

Proceed as follows:

- place the scooter on its centre stand;
- lift the engine a little with a jack so as to free the two shock absorbers;
- remove the muffler
- undo the shock absorber spring assembly clamping screw from the support fixed to the engine on the one side and from that fixed to the muffler on the other;
- undo the two upper nuts (one on each side) fixing the shock absorber spring assembly to the frame and remove the shock absorbers themselves.





See also

Exhaust assy. Removal

Refitting

Perform the above operations in the reverse order.

Locking torques (N*m)

Shock absorber bottom mounting 33 - 41 Shock absorber top mounting 33 - 41

Exhaust bracket

Removal

- Loosen and remove the lower retaining bolt of the right-hand shock absorber at the support arm.
- Loosen the 2 retaining screws between arm and engine.
- Remove the split pin and safety cover; unscrew the wheel axle nut; use the rear brake to prevent the wheel from turning.
- Remove the support arm.

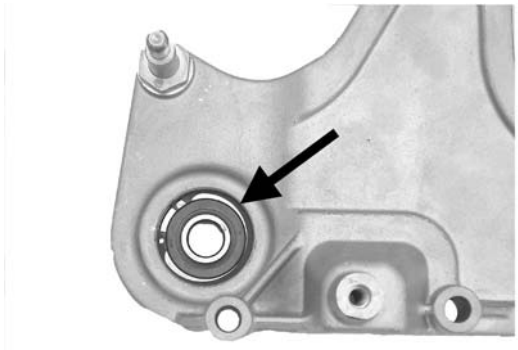
Remove the full muffler assembly.

See also

Exhaust assy. Removal

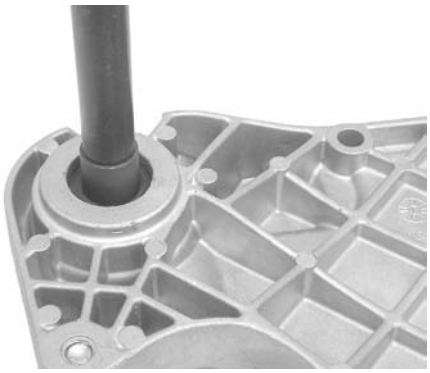
Overhaul

- Remove the circlip shown in the photograph



- Support the muffler support bracket sufficiently

- Using the special punch, remove the bearing from its seat as shown in the photograph

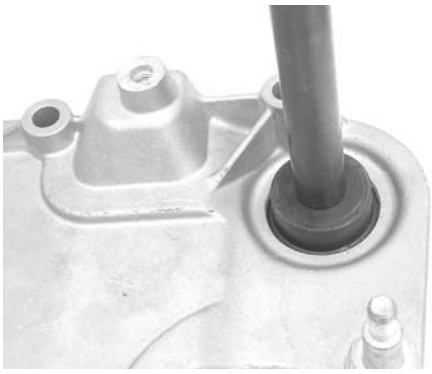


Specific tooling

020376Y Handle for adaptors

020456Y diameter 24 mm adaptor

- Heat the bearing seat using the heat gun
- Using the special punch, install a new bearing in the seat as shown in the photograph



Specific tooling

020376Y Handle for adaptors

020151Y Air heater

Refitting

To refit, carry out the removal operations in reverse order, observing the prescribed tightening torques.

Locking torques (N*m)

Rear wheel shaft nut 104 ÷ 126 Screw - muffler support arm to engine (*) 20 ÷ 25 Shock absorber bottom mounting 33 - 41

Centre-stand

- Remove the two return springs from the centre stand. - Undo the nut shown in the figure. - Remove the bolt from the right side. - Remove the centre stand. - On refitting tighten the nut to the prescribed torque.

Locking torques (N*m)

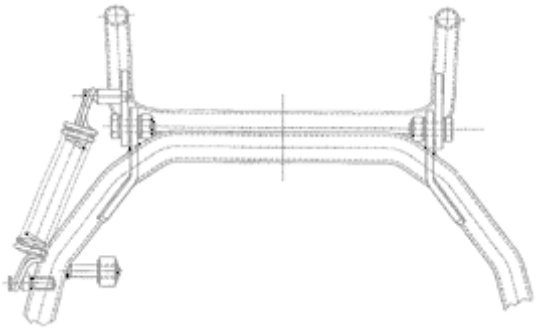
Centre-stand bolt 25 ÷ 30

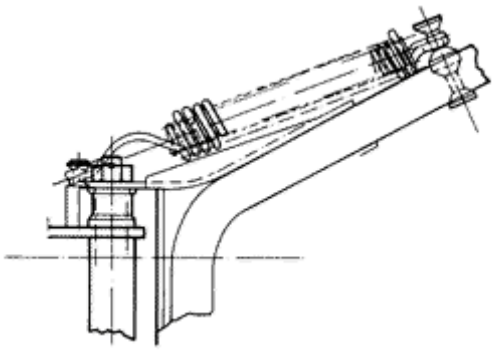
Removal

- Unhook the springs.
- Loosen the nut.
- Pull out the screw.

Reassembly

- Install the sealing rings on the support tube of the stand;
- Carry out the operations described above in reverse order, then insert the sealing rings into their seats.





CAUTION

Lubricate the following parts with grease: Spring coupling pin, bushing on stand mounting bracket.

Recommended products

TUTELA ZETA 2 Grease for steering bearings and spindle seats

NLG12 lithium soap and zinc oxide swinging arm grease

Locking torques (N*m)

Stand retaining bolt 20 ÷ 25

Side stand

Removal of the side stand

- Unhook the springs; - Loosen the nut; - Pull out the screw;

Fitting

Carry out the previous operations in reverse order.

Locking torques (N*m)

Side stand fixing bolt 35 ÷ 40

Removal of the side stand

- Unhook the springs; - Loosen the nut; - Pull out the screw;

Fitting

Carry out the previous operations in reverse order.

Locking torques (N*m)

Side stand fixing bolt 35 ÷ 40

INDEX OF TOPICS

BRAKING SYSTEM	BRAK SYS

Interventions rules

WARNING

THE FLUID FOR THE BRAKE SYSTEM IS CORROSIVE: ALWAYS WEAR PROTECTIVE GLOVES. IN THE EVENT OF ACCIDENTAL CONTACT WITH THE EYES, RINSE THE CONTACT AREA WELL WITH COPIOUS AMOUNTS OF WATER.
THE BRAKE FLUID DRAINED FROM THE SYSTEM IS HARMFUL TO THE ENVIRONMENT. COLLECTION AND DISPOSAL MUST BE CARRIED OUT IN COMPLIANCE WITH THE REGULATIONS IN FORCE. UNDER NORMAL DRIVING AND CLIMATIC CONDITIONS YOU SHOULD CHANGE THE FLUID EVERY TWO YEARS. IF THE BRAKES ARE USED INTENSELY AND/OR IN HARSH CONDITIONS, CHANGE THE FLUID MORE FREQUENTLY.
DURING INSTALLATION, THE PARTS TO BE REUSED MUST BE ABSOLUTELY CLEAN AND FREE FROM ANY TRACES OF OIL, FUEL AND GREASE: IT IS THEREFORE NECESSARY TO CARRY OUT THOROUGH CLEANING WITH PURE ALCOHOL.

N.B.

FOR TOPPING UP AND REPLACEMENT, USE ONLY BRAKE FLUID DOT4 - NHTSA 116. OBSERVE THE MAXIMUM DEGREE OF CLEANLINESS. THE HYDRAULIC FLUID IS EXTREMELY CORROSIVE FOR PAINTED SURFACES.
BRAKE FLUID IS HYGROSCOPIC; IT TENDS TO ABSORB MOISTURE FROM THE SURROUNDING AIR.
IF THE MOISTURE CONTENT IN THE BRAKE FLUID EXCEEDS A CERTAIN VALUE, IT WILL RESULT IN REDUCED BRAKING EFFICIENCY AND A REDUCTION IN THE BOILING POINT OF THE FLUID.

N.B.

ALWAYS STORE THE FLUID IN SEALED CONTAINERS.

N.B.

RUBBER PARTS SHOULD NEVER BE LEFT IN ALCOHOL FOR LONGER THAN 20 SECONDS. AFTER WASHING, THE PIECES MUST BE DRIED WITH A BLAST OF COMPRESSED AIR AND A CLEAN CLOTH.
THE SEAL RINGS MUST BE IMMERSED IN THE OPERATING LIQUID; THE USE OF THE PRF1 PROTECTION IS TOLERATED.

WARNING

THE PRESENCE OF BRAKE FLUID ON THE DISC OR BRAKE PADS REDUCES THE BRAKING EFFICIENCY. IN THIS CASE, REPLACE THE PADS AND CLEAN THE DISC WITH A HIGH-QUALITY SOLVENT.

Rear brake calliper

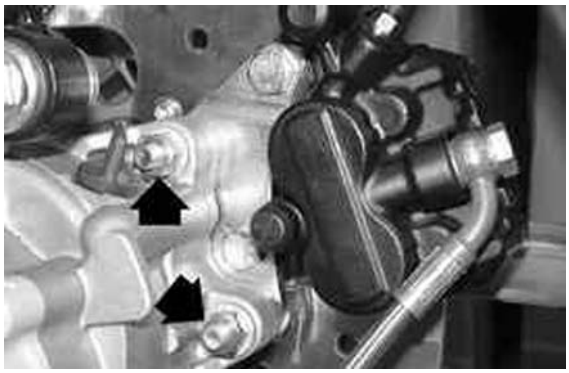
Removal

- Inspect the condition of the hoses, packing and

joint. In the event of fluid leaks from the calliper,

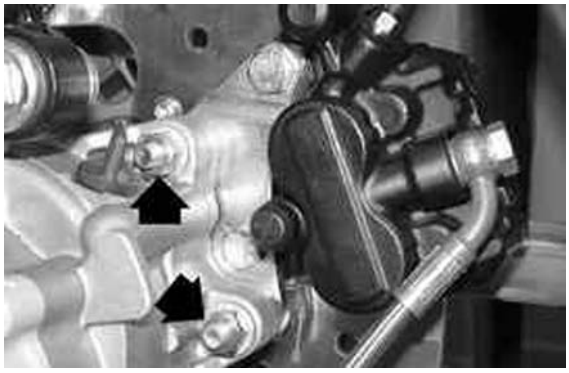
this must be replaced.

- Detach the brake hosed from calliper, pouring the fluid inside a container.
- Remove the mountings indicated in the figure.



Refitting

- Fix the brake calliper support plate to the crank-case and the brake calliper to the bracket, tightening the screws to the prescribed torque.
- Apply the recommended product to the retaining screws of the brake calliper to the bracket.
- Bleed the air from the system.



N.B.

DURING ASSEMBLY, REPLACE THE GASKETS ON THEIR FITTINGS.

Recommended products

Loctite 243 Medium threadbrake

Medium Loctite threadbrake 243

Locking torques (N*m)

Oil bleed screw 12 ÷ 16 Screw tightening calliper to the support 23 ÷ 25 Retaining screw for rear brake calliper support to engine 20 ÷ 25 Brake fluid tube - calliper fitting 16 ÷ 20

See also

Rear - combined

Front brake calliper

Removal

- Inspect the condition of the hoses, packing and joint. In the event of fluid leaks from the calliper,

this must be replaced.

- Detach the brake hosed from calliper, pouring the fluid inside a container.
- Remove the mountings indicated in the figure.

Overhaul

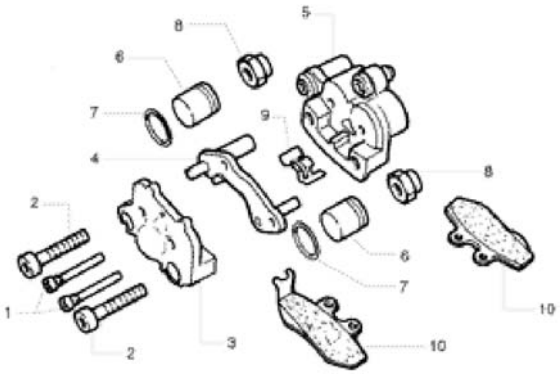
Proceed as follows:

1) remove the two hexagon screws (1) and extract the two pads (10);

2) remove the two hexagon screws (2) and remove the reaction plate (3);

3) extract the fixed plate (4) from the guides;

4) remove the internal parts from the floating body (5) using small jets of compressed air through the brake fluid duct to facilitate the ejection of the pistons (6).



5) Check:

- that plates and body are in good working order;
- that the cylinders of the caliper floating body exhibit no scratches or erosion; otherwise, replace the entire caliper;
- that the fixed plate guides exhibit no scratches or erosions; otherwise, replace the plate;
- that the pads locking bracket is efficient.

Re-assembly

1) insert in the body the pistons (6) with the sealing rings (7);

2) fit the guide rubber caps (8) and replace the fixed plate (4);

3) install the reaction plate (3) tightening the screws (2), insert the pad locking bracket (9) and

the pads, and fix them by the relevant screws (1);

5) place the caliper on the disc and tighten it to the upright tightening the fixing screws;

6) tighten the pipe union to the caliper at the prescribed torque.

Operation

The caliper used is of the floating type.

It uses the action and reaction principle to obtain the thrust on both pads.

The reaction plate and body are integral and can move axially relative to the fixed plate, which is integral to the upright.

The pistons, stressed by the pressure to press the pad against the disc, for reaction force the reaction plate to press the other pad against the disc.

The pads locking bracket

1. Pads fixing screws
2. Reaction plate fixing screws
3. Reaction plate
4. Fixed plate
5. Floating body
6. Piston
7. Piston sealing rings
8. Guide protection rubber caps
9. Pads locking bracket
10. Pads

CAUTION

ALL THE SEALS AND GASKETS MUST BE REPLACED EVERY TIME THE CALLIPERS ARE SERVICED.

Locking torques (N*m)

Pliers-pipe oil union 20 ÷ 25 Pad fastening pin 19.6 ÷ 24.5

Refitting

- When refitting, tighten the nuts to the prescribed torque.
- Bleed the system.

N.B.

DURING ASSEMBLY, REPLACE THE GASKETS ON THEIR FITTINGS.

Locking torques (N*m)

Oil bleed screw 12 ÷ 16 Screw tightening calliper to the support 20 ÷ 25 Brake fluid tube - calliper fitting 16 ÷ 20

See also

Front

Rear brake disc

Removal

- Remove rear wheel.
- Remove rear hub complete with brake disc.
- Follow the same instructions given for the front brake disc.

See also

Removing the rear wheel

Refitting

- For the installation, position the disc correctly using the arrow stamped on it as reference.
- Tighten the screws to the prescribed torque and apply the recommended product.

N.B.

THE SURFACE OF THE DISC WITH THE STAMPED ARROW FOR THE DIRECTION OF ROTATION MUST FACE TOWARDS THE OUTSIDE OF THE SCOOTER.

Recommended products

Loctite 243 Medium threadbrake

Medium Loctite threadbrake 243

Locking torques (N*m)

Brake disc retaining screws 11 ÷ 13

Disc Inspection

Checking the disc is important; it must be perfectly clean, with no sign of rust, oil or grease or other dirt and must not show signs of deep scoring.

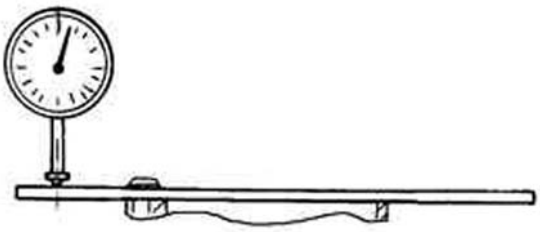
Characteristic

New rear disc thickness

4.0 mm

Disc thickness at wear limit (rear)

3.5 mm



- Remove the wheel and check using the appropriate tools that the axial run-out of the brake surface is within the prescribed limits.
- If this is not the case, replace the disc and repeat the test.

CAUTION

WHEN INSTALLING, THOROUGHLY CLEAN THE DISC AND ITS SEAT ON THE HUB.

Characteristic

Max. axial run-out

0.1 mm

Front brake disc

Removal

Proceed as follows:

- Remove the front wheel
- Loosen the five disc retaining screws.

- Thoroughly clean the seats on the front wheel hub and on the disc.

See also

Removing the front wheel

Refitting

For the fitting, position the disc correctly using the arrow stamped on it as reference.

- Do up the screws to the prescribed torque and apply the recommended product

N.B.

THE ARROW STAMPED ON THE DISC INDICATING THE RUNNING DIRECTION MUST BE FITTED TOWARDS THE OUTSIDE OF THE scooter.

Recommended products

Loctite 243 Medium threadbrake

Medium Loctite threadbrake 243

Locking torques (N*m)

Brake disc retaining screw 5 ÷ 6.5

Disc Inspection

Checking the disc is important; it must be perfectly clean, with no sign of rust, oil or grease or other dirt and must not show signs of deep scoring.

Characteristic

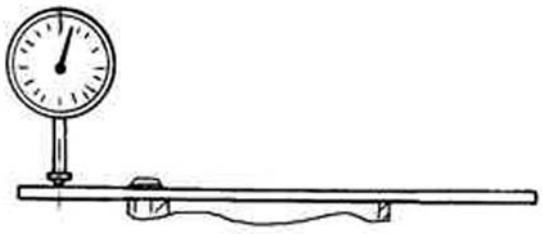
Thickness of a new front disc

4.0 mm

Disc thickness at wear limit (front)

3.5 mm

- Remove the wheel and check using the appropriate tools that the axial run-out of the brake surface is within the prescribed limits.
- If this is not the case, replace the disc and repeat the test.



CAUTION

WHEN INSTALLING, THOROUGHLY CLEAN THE DISC AND ITS SEAT ON THE HUB.

Characteristic

Max. axial run-out

0.1 mm

Front brake pads

Removal

Proceed as follows:

- Remove the front brake calliper.
- Loosen the two pins indicated in the figure that lock the two pads.
- Remove the pads, being careful of the pads' spring clamp .
- Check the thickness of the pads.

Characteristic

Minimum value

1.5 mm

See also

Front brake calliper

Refitting

To fit, proceed as follows:

- Insert the two pads in the callipers.
- Screw the two pad lock pins to the correct torque, and apply the recommended product.
- Continue with assembly of the calliper on its support, tightening the two screws to the prescribed

torque.

N.B.

IF IT IS NOT POSSIBLE TO CORRECTLY POSITION THE CALLIPER ON THE DISC DURING FITTING, GENTLY EXPAND THE PADS.

Recommended products

Loctite 243 Medium threadbrake

Medium Loctite threadbrake 243

Locking torques (N*m)

Screw tightening calliper to the support 20 ÷ 25 Pad fastening pin 19.6 ÷ 24.5

Rear brake pads

Removal

Proceed as follows:

- Remove the rear brake calliper.
- Remove the two pins holding the brake pads.
- Remove the pads, paying attention to the pad retaining spring.
- Check the thickness of the pads.

If the thickness is less than the minimum value, replace the pads with new pads.

Characteristic

Minimum value

1.5 mm

See also

Removal

Refitting

Carry out the installation by analogy with the procedure described for the installation of the rear brake calliper.

- Tighten the two calliper retaining screws to the prescribed tightening torque.

Locking torques (N*m)

Pad fastening pin 19.6 ÷ 24.5 Screw tightening calliper to the support 20 ÷ 25 Retaining

screws for the calliper support on the engine 20 ÷ 25

Fill

Rear - combined

Proceed as follows:

- Position the vehicle on a flat surface and on the stand
- Loosen the two screws shown in the figure and open the front brake fluid reservoir.
- Through the bleed screw on the brake calliper, bleed the system using a hose of adequate diameter.
- Collect the used fluid in a container.
- Pump on the brake lever to completely drain the system of all used fluid.
- Tighten the bleed valve.
- Refill the brake system tank up to the maximum level with the prescribed fluid.
- Attach the tube of the special tool to the bleed fitting.
- Actuate the tool at the bleed fitting, at the same time constantly topping up the brake system tank to prevent air being drawn into the system, until no more air escapes at the bleed fitting. The operation is finished when only brake fluid comes out of the bleed screw.
- Close the bleed screw and tighten to the prescribed torque.
- Close the brake system tank.

N.B.

IF AIR CONTINUES TO COME OUT DURING THE BLEED OPERATION, EXAMINE ALL THE FITTINGS. IF SAID FITTINGS DO NOT SHOW SIGNS OF BEING FAULTY, LOOK FOR THE AIR INPUT AMONG THE VARIOUS SEALS ON THE PUMP AND CALLIPER PISTONS. WHEN CARRYING OUT THE OPERA-

TION, BRAKE FLUID MAY LEAK FROM THE BLEED SCREW ON THE CALLIPER AND ON THE DISC. IN THIS CASE; CAREFULLY CLEAN THE CALLIPER AND DEGREASE THE BRAKE DISC.

Specific tooling

020329Y MITYVAC vacuum pump

Locking torques (N*m)

Oil bleed screw 12 ÷ 16

Front

Proceed as follows:

- Position the vehicle on a flat surface and on the stand
- Loosen the two screws shown in the figure and open the front brake fluid reservoir.
- Through the bleed screw on the brake calliper, bleed the system using a hose of adequate diameter.
- Collect the used fluid in a container.
- Pump on the brake lever to completely drain the system of all used fluid.
- Tighten the bleed valve.
- Refill the brake system tank up to the maximum level with the prescribed fluid.
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- Actuate the tool at the bleed fitting, at the same time constantly topping up the brake system tank to prevent air being drawn into the system, until no more air escapes at the bleed fitting. The operation is finished when only brake fluid comes out of the bleed screw.
- Close the bleed screw and tighten to the prescribed torque.
- Close the brake system tank.

N.B.

IF AIR CONTINUES TO COME OUT DURING THE BLEED OPERATION, EXAMINE ALL THE FITTINGS. IF SAID FITTINGS DO NOT SHOW SIGNS OF BEING FAULTY, LOOK FOR THE AIR INPUT AMONG THE VARIOUS SEALS ON THE PUMP AND CALLIPER PISTONS. WHEN CARRYING OUT THE OPERATION, BRAKE FLUID MAY LEAK FROM THE BLEED SCREW ON THE CALLIPER AND ON THE DISC. IN THIS CASE; CAREFULLY CLEAN THE CALLIPER AND DEGREASE THE BRAKE DISC.

Specific tooling

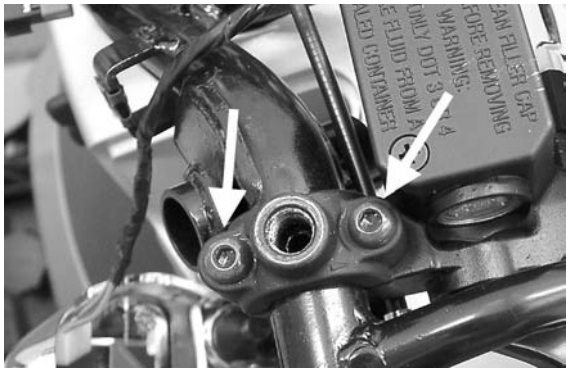
020329Y MITYVAC vacuum pump

Locking torques (N*m)

Oil bleed screw 12 ÷ 16

Front brake pump

Removal



- Remove the rear handlebar cover.
- Drain the brake system.
- Disconnect the brake fluid line from the pump, paying attention to a possible escape of remaining brake fluid.
- Remove the front and rear brake stop button from the lever.
- Loosen the two retaining screws of the stand and remove together with the rear view mirror.
- Remove the front brake pump together with the lever.

See also

Rear handlebar cover
Front

Overhaul

1) Remove the brake lever by loosening the retaining screw;

open the cover (2) and take out the diaphragm (3);

2) Remove the cap and unscrew the internal parts in orden;

3) Check that:

- The body of the pump shows no signs of internal damage or corrosion;
- The piston shows no sign of damage or abnormal wear;
- The piston return spring is in good condition.

Reassembly

Reinstall the individual parts in the reverse order to the removal, paying attention to the correct positioning of the rubber parts in order to ensure leak tightness.

1. Tank cover screw
2. Tank cover
3. Diaphragm
4. Bellows
5. Seal ring
6. Piston
7. Gasket
8. Spring
9. Tank

CAUTION

ALL THE SEALS AND GASKETS MUST BE REPLACED EVERY TIME THE PUMP IS SERVICED.

Refitting

- On refitting, perform the operation in reverse.
- Tighten the hydraulic line to the prescribed torque and bleed the system.
- When the operation is over, tighten the brake fluid bleed screw to the prescribed torque.

WARNING

THE BRAKE FLUID IS HYGROSCOPIC, IN OTHER WORDS, IT ABSORBS MOISTURE FROM THE SURROUNDING AIR. IF THE LEVEL OF MOISTURE IN THE FLUID EXCEEDS A GIVEN VALUE, BRAKING EFFICIENCY WILL BE REDUCED. THEREFORE, ALWAYS USE FLUID FROM SEALED CONTAINERS. UNDER NORMAL DRIVING AND CLIMATIC CONDITIONS YOU SHOULD CHANGE THIS LIQUID EVERY TWO YEARS. IF THE BRAKES ARE USED INTENSELY AND/OR IN HARSH CONDITIONS, CHANGE THE FLUID MORE FREQUENTLY.

CAUTION

WHEN CARRYING OUT THE OPERATION, BRAKE FLUID MAY LEAK FROM BETWEEN THE BLEED SCREW AND ITS SEAT ON THE CALLIPER. CAREFULLY DRY THE CALLIPER AND DEGREASE THE DISC SHOULD THERE BE BRAKE FLUID ON IT.

Locking torques (N*m)

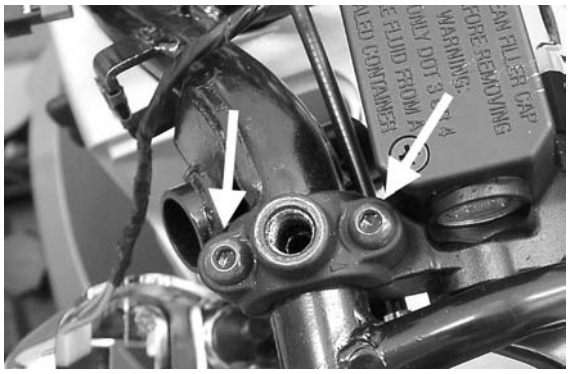
Oil bleed screw 12 ÷ 16 Hydraulic line retaining screw: 16 ÷ 20 Handlebar control assembly u-bolts clamping screws 7 ÷ 10

See also

Front

Rear brake pump - combined

Removal



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- Drain the brake system.
- Disconnect the brake fluid line from the pump, paying attention to a possible escape of remaining brake fluid.
- Remove the front and rear brake stop button from the lever.
- Loosen the two retaining screws of the stand and remove together with the rear view mirror.
- Remove the front brake pump together with the lever.

See also

Rear handlebar cover
Rear - combined

Refitting

- On refitting, perform the operation in reverse.
- Tighten the hydraulic line to the prescribed torque and bleed the system.
- When the operation is over, tighten the brake fluid bleed screw to the prescribed torque.

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CAUTION

WHEN CARRYING OUT THE OPERATION, BRAKE FLUID MAY LEAK FROM BETWEEN THE BLEED

SCREW AND ITS SEAT ON THE CALLIPER. CAREFULLY DRY THE CALLIPER AND DEGREASE THE DISC SHOULD THERE BE BRAKE FLUID ON IT.

Locking torques (N*m)

Oil bleed screw 12 ÷ 16 Hydraulic line retaining screw: 16 ÷ 20 Handlebar control assembly u-bolts clamping screws 7 ÷ 10

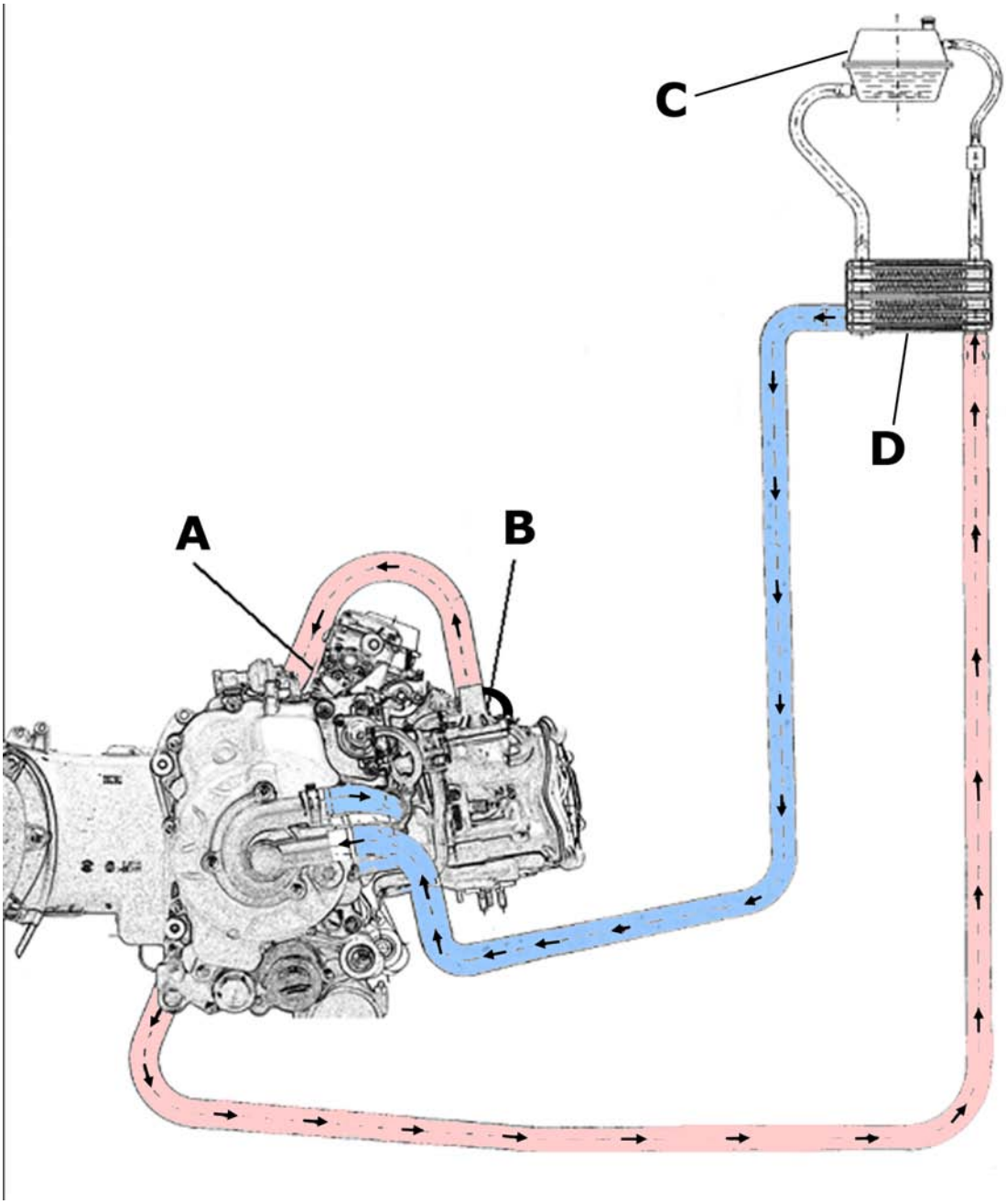
See also

Front

INDEX OF TOPICS

COOLING SYSTEM	COOL SYS

Circuit diagram



ENGINE COOLING CIRCUIT

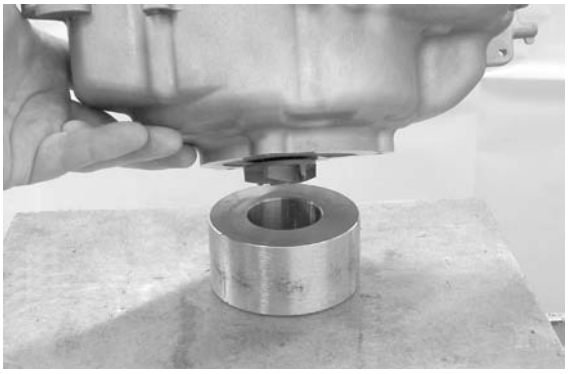
Specification	Desc./Quantity
A	Carburettor heating circuit
B	Thermostat with by-pass
C	Expansion tank
D	Radiator

Water pump - overhaul

- Remove the complete flywheel cover
- Remove the stator
- Remove the pump cover by loosening the 3 fixing screws
- Remove the sealing gasket

The pump can be services using the special tool and a press. The special tool is designed to be used with the presses most commonly found in workshops. For those presses equipped with a 35-mm piston and protective cap with fixing screw, it is sufficient to remove the cap and install the components of the special tool in its place.
The special tool can be prepared in advance depending on its use on presses equipped with piston with a threaded type of coaxial coupling tang or cylindrical with stop groove. Then prepare the threaded ring with the adapter suitable for the coupling of the press used.

- Position the flywheel cover in the hydraulic press by inserting the impeller in the ring that is part of the special tool, as shown in the photo



N.B.

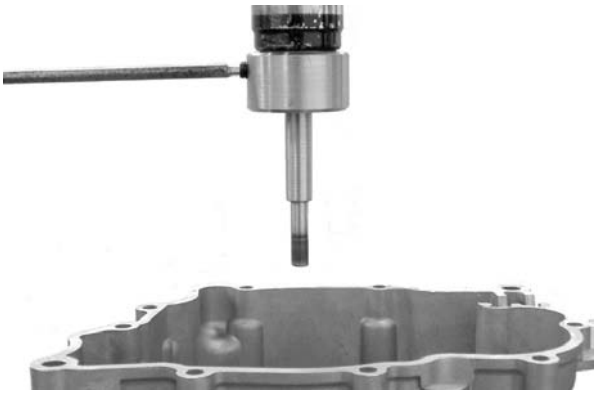
POSITION THE BASE WITH THE SURFACE PROVIDED WITH BETTER FINISH TURNED TOWARDS THE FLYWHEEL COVER. FAILURE TO COMPLY WITH THIS INSTRUCTION MAY RESULT IN DETERIORATION OF THE SURFACE INTENDED FOR THE COOLANT'S SEAL.

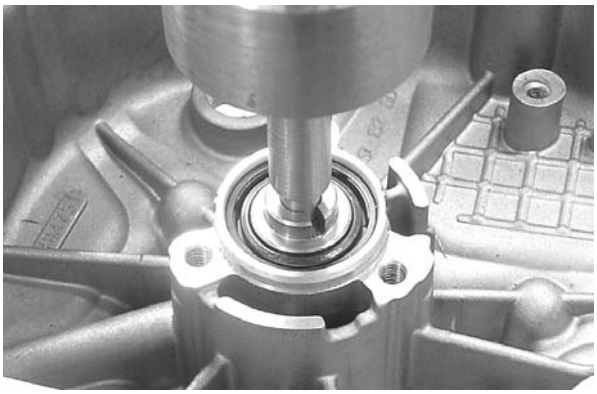
Specific tooling

020628Y Water pump overhaul kit - quasar 250

Install the pin that is part of the special tool on the press piston.
Turn the flywheel cover until it permits insertion of the pin inside the joint and eject the pump shaft

from the joint and bearings.





Specific tooling

020628Y Water pump overhaul kit - quasar 250

Remove the ceramic seal from the pump shaft.

Using a screwdriver, remove the ceramic ring and sealing gasket from the flywheel cover.

N.B.

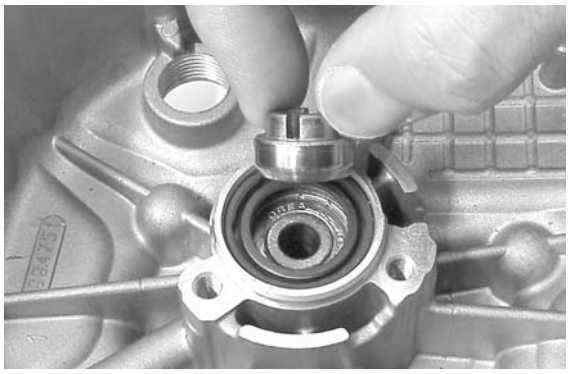
IN THE EVENT YOU PLAN TO REUSE THE MECHANICAL SEAL, PAY ATTENTION DURING THE DISASSEMBLY STAGES IN ORDER TO NOT CHIP THE CERAMIC RING.

- Remove the joint from the seat inside the seal ring.
- Position the flywheel cover in the press while sustaining it using the surface to be used for coupling with the engine case.

CAUTION

CHECK THE POSITIONING OF THE CENTRING DOWELS. PROPERLY PROTECT THE COUPLING SURFACE.

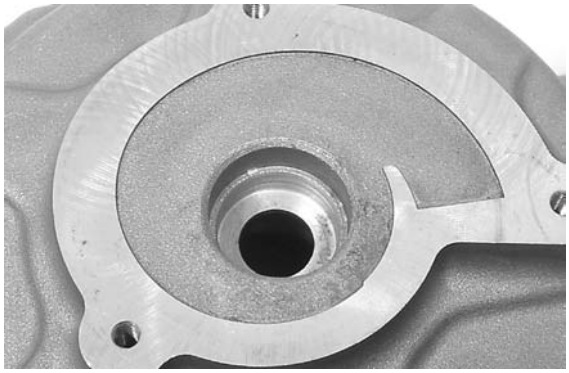
Centre the cover until it permits insertion of the pin and then eject the seal ring and the two ball bearings.

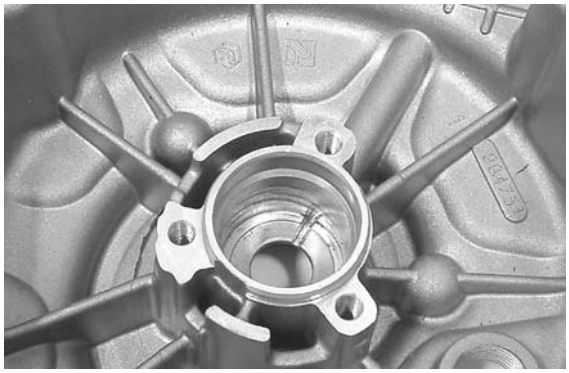


Specific tooling

020628Y Water pump overhaul kit - quasar 250

Before you reassemble, wash all the components and continue with the following checks.
Flywheel cover: Check that there are no cracks or oxidation on the seat of the ceramic seal. Check the capacity loads of the bearings and of the seal ring. Check the efficiency of the drain hole.





Shaft: Check to be sure there is no oxidation.

Check that the impeller is in perfect condition.

Ceramic seal: Check that the ceramic seals are not worn, cracked or scored. Check that the two rubber seals are in perfect condition. Check the thrust spring.

Bearings: Check that they do not have irregular plays or are noisy.

Entrainment joint: Check that there is no abnormal wear on the seat for the oil seal seat and on the slots for the entrainment spring.

Heat the flywheel cover using the heat gun

N.B.

IF THE JOB IS PERFORMED WITH THE STATOR MOUNTED, HEAT FROM THE EXTERNAL SIDE OF THE COVER.

Specific tooling

020151Y Air heater

020150Y Air heater support

Properly support the cover and using the modular punch, install the two bearings all the way down at the same time.

N.B.

WORK IN AN UPRIGHT POSITION

Specific tooling

020376Y Handle for adaptors

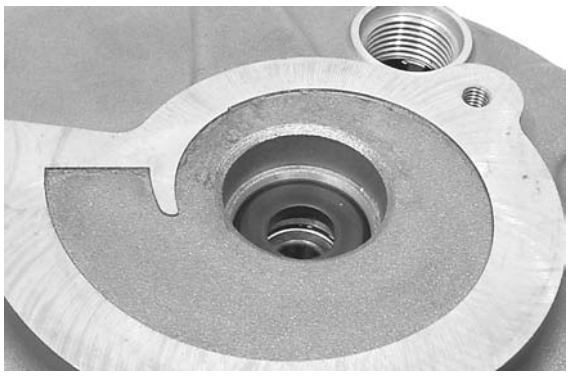
020441y 26 x 28 mm adapter

020629y 8 mm guide

Let the flywheel cover guard cool down and then manually mount the static part of the ceramic seal with the relative rubber seal.

N.B.

PAY ATTENTION TO MOUNTING THE CERAMIC RING CORRECTLY. THE CHAMFER ON THE INTERNAL DIAMETER MUST BE TURNED AWAY FROM THE SIDE OF THE BEARINGS.

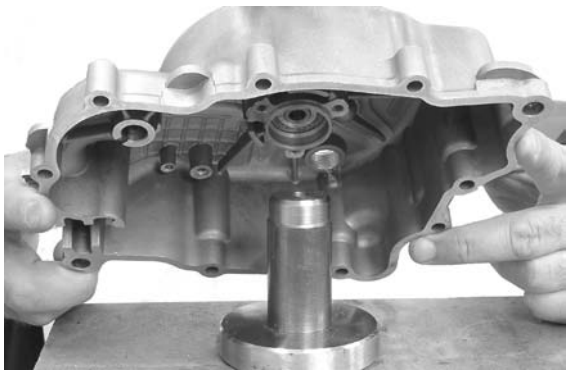


Mount the moving part of the ceramic seal on the shaft with the impeller. The rubber part must rest against the impeller.

Position the flywheel cover on the press using the support base for the bearings that is part of the special tool. Install the special punch with the impeller's template on the press piston.

Specific tooling

020628Y Water pump overhaul kit - quasar 250



Manually insert the pump shaft in the relative

bearings.

While keeping the bearings in contact with the support base, line up the shaft with the press piston and proceed with the driving. The driving depth is determined by the beat of the punch when it is in contact with the flywheel cover.

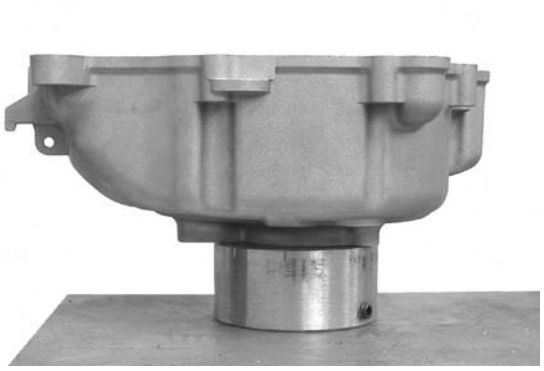
N.B.

SO AS TO NOT DAMAGE THE FLYWHEEL COVER DURING THE DRIVING OPERATION, SLIGHTLY TURN IT BY HAND IN ORDER TO BETTER PERCEIVE THE MOMENT OF CONTACT WITH THE PUNCH.

Specific tooling

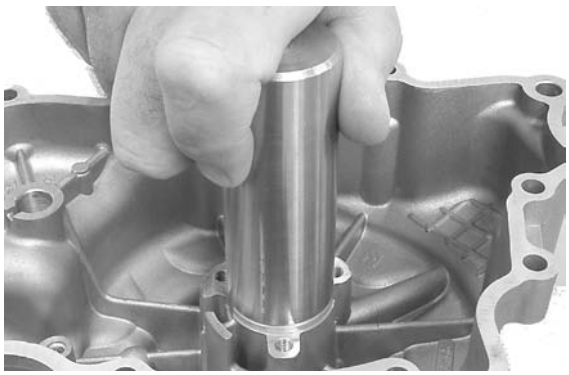
020628Y Water pump overhaul kit - quasar 250

Remove the special punch from the press piston and support the flywheel cover from the impeller side with it.



Put the new oil seal on the special punch while being careful to position the seal lip starting from the side of the handle.

Install the oil seal on the flywheel cover all the way to the depth determined by the punch.



Specific tooling

020628Y Water pump overhaul kit - quasar 250

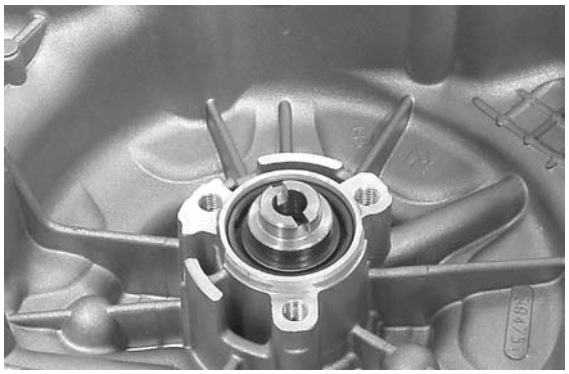
Fit the punch with the template of the entrainment joint to the press punch.

Position the entrainment joint on the shaft and using the press, drive it to the depth determined by the punch.

Specific tooling

020628Y Water pump overhaul kit - quasar 250

Lubricate the oil seal with motor oil.



Water pump ceramic seal

Our Leader, Quasar, and Master liquid cooled engines are equipped with water pumps fitted with the ceramic seal in the subject. This component is intended to guarantee the leak tightness of the coolant in relation to the pump shaft. The seal achieved via two special ceramics, a static one and a spinning one, kept in contact by the thrust of a spring, coaxially mounted onto the pump shaft. The efficiency of this system is guaranteed by the accurate machining and cleaning of the components as they are fitted; in any case, ceramic seals are subjected to a running in period. During this period (1,000 ± 1,500 km), there may be small leakages through draining holes, which remain visible on the aluminium crankcase. This phenomenon is particularly visible there where the hole is more exposed (Quasar and Master). In such cases we recommend cleaning the casing in order to be able to check again for leaks after a distance of more than 1500 km. If leaks continue or in the event of real losses, the ceramic seal should be replaced. For these operations, observe the tools and instructions given in the relevant service station manuals.

Note: The ceramic seal may be overhauled according to the following couplings:

- Coupling "A": seal ring no. 485084 with ceramic seal no. 486216
- Coupling "B": seal ring no. 841329 with ceramic seal no. 841330

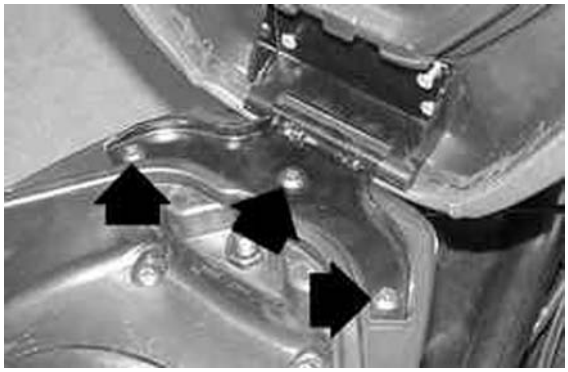
The couplings above may be selected according to their availability, as they are interchangeable.

INDEX OF TOPICS

CHASSIS	CHAS

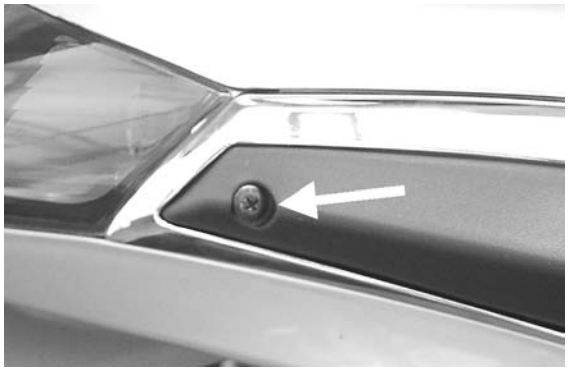
Seat

- Remove the saddle by loosening the three retaining screws indicated in the figure;



Side fairings

- Remove side bumpers by removing the mounting screws shown in the figure (one on each side).

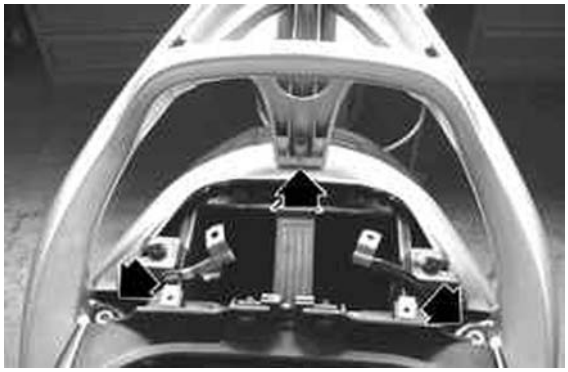


Rear rack

- Loosen the two mounting screws and remove the battery cover.

Remove the plastic cover of the rear luggage rack by removing the two side screws from the lower side of the rack.

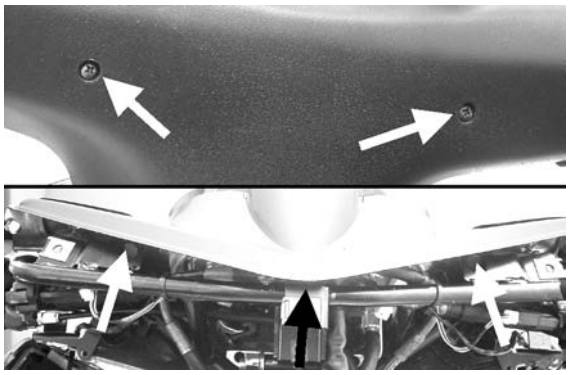
- Loosen the 3 hexagonal retaining screws indicated in the figure and remove luggage rack.



Rear handlebar cover

- Remove the front handlebar cover.
- Remove the 3 screws shown in the photograph.
- Remove the 2 screws on the rear part of the

handlebar cover shown in the photograph.

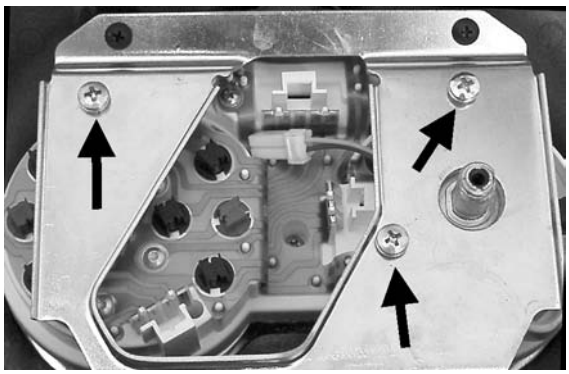


See also

Front handlebar cover

Instrument panel

- Remove the rear handlebar cover.
- Disconnect the cable harness.
- Remove the odometer cable.
- Remove the 3 screws shown in the photograph.
- Remove the instrument panel.

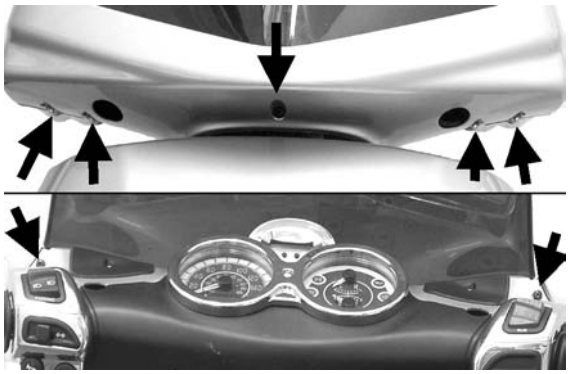


See also

Rear handlebar cover

Front handlebar cover

- Remove the 5 screws on the front part of the handlebar cover shown in the figure.
- Remove the 2 screws on the rear part of the handlebar cover shown in the figure.



Headlight assy.

- Remove the front headlight assembly by loosening the 4 retaining screws, two of which are shown in the figure and two located further down.
- Separate the electrical connectors; - Pull out the headlight assembly.

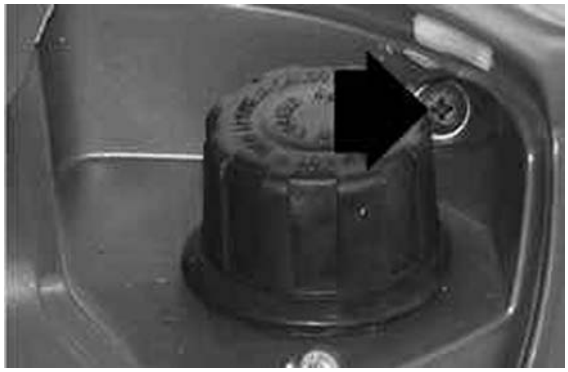
Frame central cover

- Open the fuel tank access port.
- Loosen the 4 screws shown in the figure.
- At the same time, remove the fuel tank cap.

Remove the chassis central cover by sliding it from the rear side of the scooter and disconnecting it from the cover opening transmission.

Legshield

- Remove the headlight assembly.
- Remove the central chassis cover.
- Remove the retaining screw of the expansion tank access cover.
- Loosen the 2 retaining screws on the upper part of the counter-shield, one of which is shown in the figure.
- Remove the remaining 2 retaining screws of the front shield with the wheel housing.



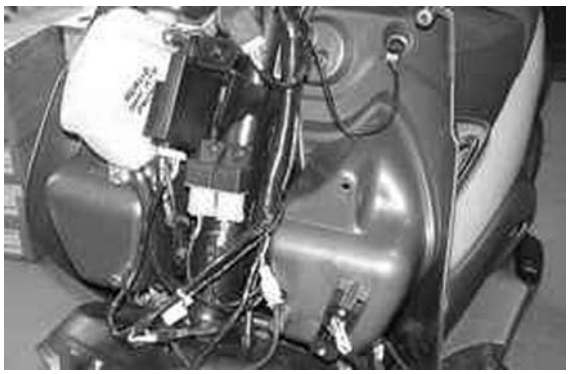
- Loosen the 2 screws shown in the figure.
- Remove the front shield.

See also

Headlight assy.
Frame central cover

Knee-guard

- Remove the front shield; - Remove the 2 retaining screws of the fuse holder in the front glove box; - Separate the electrical connections; - Remove the expansion tank; - Loosen the retaining screw inside the glove box and the two screws located under the central frame cover; - Disconnect the saddle closing mechanism; - Remove the rear shield with the glove box.



See also

Legshield

Removing the ignition key-switch when on *off*

- Remove the shield back plate.
- Remove the immobilizer aerial as shown in the figure.

- Detach the electrical wiring.
- Remove the ignition key-switch, by removing the spring retainer shown in the figure.

- Lightly push the master-cylinder and extract the shaping shown in the figure.
- Hence extract the master-cylinder complete with the key-switch.
- For the reassembly proceed in the reverse order.

See also

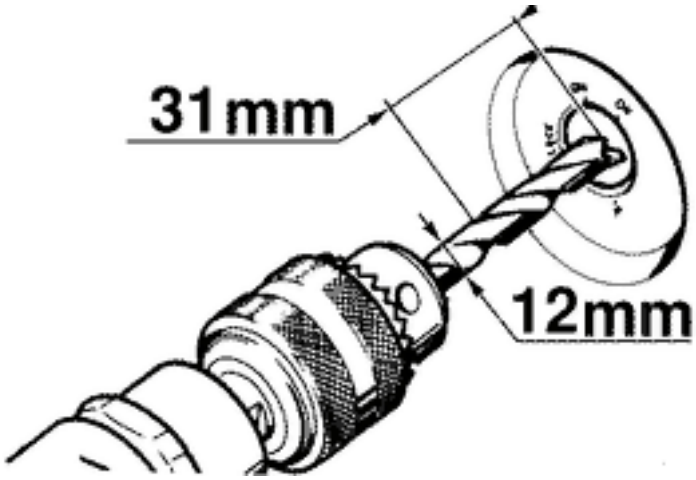
Knee-guard

Removing the ignition key-switch when on *lock*

In position "Lock", it is not possible to access the cylinder retaining spring. The spring must then be removed as shown in the figure, allowing the lock spring to be pressed out.

N.B.

FOR REASSEMBLY OF THIS ITEM, THE SCOOTER STEERING LOCK MUST BE RELEASED WITH THE LOCK BODY (INTERNAL AND EXTERNAL PART) IN POSITION "OFF". PROCEED AS DESCRIBED IN THE PREVIOUS PARAGRAPH.



See also

Removing the ignition key-switch when on *off*

Front wheel housing

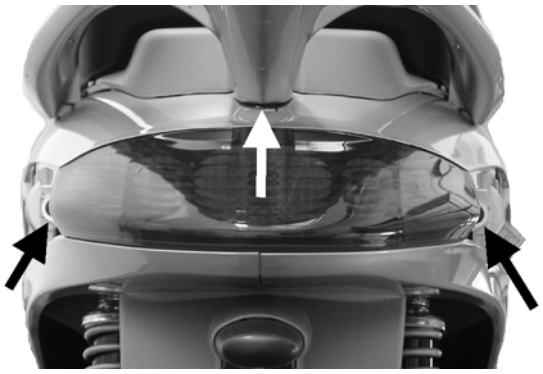
- Remove the shield back plate.
- Remove the footrests.
- Remove the front suspension.
- Loosen the remaining retaining screws holding the central frame cover.
- Remove the radiator cover.

See also

Knee-guard
Footrest
Removing the front wheel

Taillight assy.

- Remove the cover of the luggage rack (snapped-in).
- Remove the side bumpers.
- Unscrew the 3 screws holding the rear light.
- Remove the rear light assembly after disconnecting the electrical cable harness.

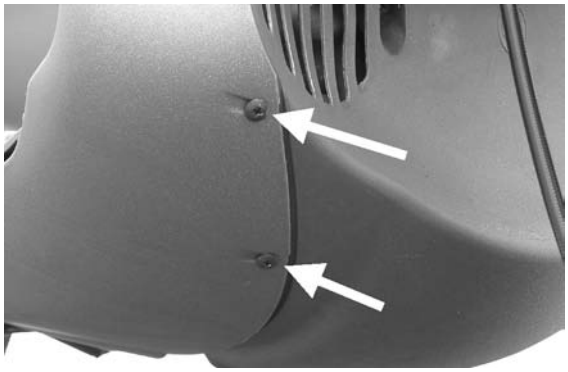


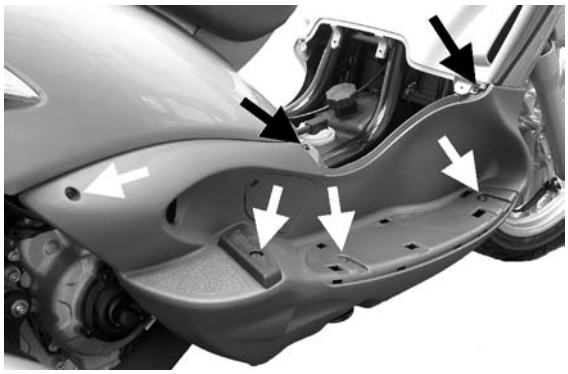
See also

Side fairings

Footrest

- Remove the central cover.
- Remove the RHS footrest mat.
- Loosen the eight footrest mounting screws.
- Remove the RHS footrest.
- Repeat the same operations for the LHS footrest.





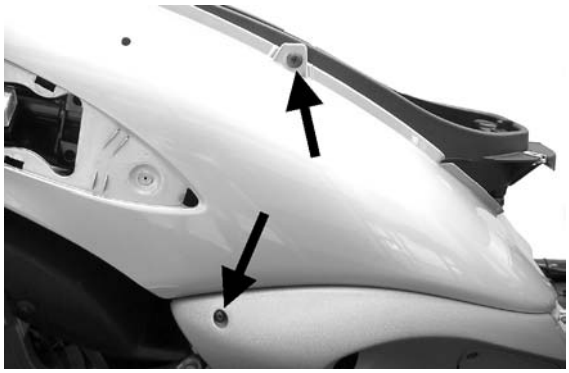
See also

Frame central cover

Side fairings

- Remove the saddle.
- Remove the luggage rack.

- Remove the central cover.
- Remove the rear light assembly.
- Remove the cover under the saddle by loosening the retaining screw located under the saddle mounting plate.
- Loosen the 6 side-fairing fixing screws indicated in the 3 photographs.
- Remove the fairings.



See also

Seat
Rear rack
Frame central cover
Taillight assy.

Rear mudguard

- Loosen the 4 fixing screws, 2 of which are indicated in the figure and the other 2 located on the opposite side under the air filter; - Remove the rear mudguard.

Helmet bay

- Remove the canister cover from inside the helmet compartment and hence remove all of its components (see the "Maintenance - Anti-evaporative System - Components Removal" chapter).
- Rimuovere il coperchio dell'impianto Canister all'interno del vano portacasco quindi - Remove the side panels.
- Detach the electrical connectors.
- Unscrew the eight fixing screws, four of which located inside the helmet compartment.
- Remove the number-plate holder tail after unscrewing the four fixing screws shown in the figure and disconnecting the wiring.
- Remove the helmet compartment.

See also

Removing system components

Fuel tank

- Remove the knee-guard.
- Remove the front wheel housing.
- Remove the footrest.
- Remove the roll-over valve breather tube.

N.B.

THIS OPERATION SHOULD PREFERABLY BE PERFORMED WITH THE TANK EMPTY.

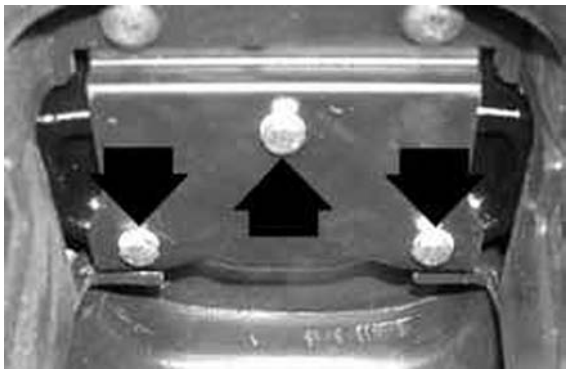
- Disconnect the fuel gauge electrical connector, the fuel feed pipe and the tank breather pipe.
- Loosen the horn fixing screw shown in the figure at the top and then remove the horn after detaching the electrical connector.
- Remove the cross members after loosening the four fixing screws.
- Remove the bracket after loosening the two screws that fix it to the frame.
- Remove the two screws fixing the tank to the frame.
- Tip the tank and remove it from below.

See also

Knee-guard
Front wheel housing
Footrest

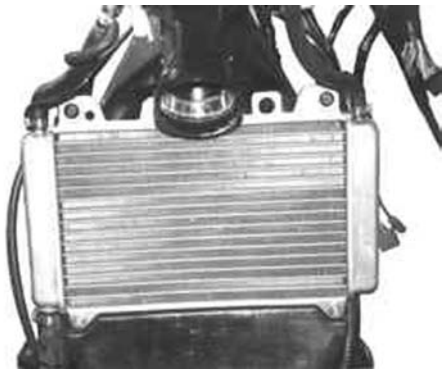
Front mudguard

- Remove the retaining screw of the cable lead-through support on the right-hand side of the mudguard. - Loosen the 3 fixing retaining screws indicated in the figure and remove the mudguard.



Radiator fan

- Remove the front wheel housing. - Prepare a container for the coolant. - Remove the expansion tank outlet and return pipes. - Remove the coolant supply and return pipes from the radiator. - Loosen the screw mounting the radiator to the frame. - Disengage the radiator and the electric fan.



See also

Front wheel housing

Flyscreen

- Remove the front handlebar cover.
- Remove the 3 screws shown in the photograph.

See also

Front handlebar cover

INDEX OF TOPICS

PRE-DELIVERY	PRE DE

Before handing over the scooter, carry out the listed checks.

Warning- be very careful when handling fuel.

Aesthetic inspection

Appearance checks:

- Paintwork
- Fitting of plastics
- Scratches
- Dirt

Tightening torques inspection

Lock check

- Safety locks
- clamping screws

Safety locks

Rear shock absorber upper fitting
Rear shock absorber lower fitting
Front wheel axle nut
Wheel hub nut
Frame - swinging arm bolt *
Swinging arm bolt - Engine
Engine arm pin - Frame arm
Handlebar lock nut
Lower steering ring nut
Upper steering ring nut

Electrical system

Electrical system

- Main switch
- Headlamps: high beam, low beam, position and parking lights and the respective warning lights
- Adjusting the headlights according to the regulations currently in force

- Tail light, parking light, stop light
- Front and rear stop light switches
- Turn indicators and the respective warning lights
- Instrument lighting
- Instruments: fuel and temperature indicator
- Instrument panel warning lights
- Horn
- Starter

CAUTION

TO ENSURE MAXIMUM PERFORMANCE, THE BATTERY MUST BE CHARGED BEFORE USE. INADEQUATE CHARGING OF THE BATTERY BEFORE IT IS FIRST USED WITH A LOW LEVEL OF THE ELECTROLYTE SHORTENS THE LIFE OF THE BATTERY.

WARNING

BEFORE RECHARGING THE BATTERY, REMOVE THE PLUGS OF EACH ELEMENT.
KEEP OPEN FLAMES OR SPARKS AWAY FROM THE BATTERY DURING CHARGING.
REMOVE THE BATTERY FROM THE SCOOTER, DISCONNECTING THE NEGATIVE TERMINAL FIRST.

CAUTION

WHEN INSTALLING THE BATTERY, FIRST CONNECT THE POSITIVE CABLE AND THEN THE NEGATIVE CABLE.

WARNING

THE BATTERY ELECTROLYTE IS POISONOUS AND CAUSES SEVERE BURNS. IT CONTAINS SULPHURIC ACID. AVOID CONTACT WITH THE EYES, THE SKIN AND CLOTHING.
IN CASE OF CONTACT WITH THE EYES OR THE SKIN, RINSE GENEROUSLY WITH WATER FOR ABOUT 15 MINUTES AND SEEK IMMEDIATE MEDICAL ATTENTION.
IN CASE OF INGESTION, IMMEDIATELY DRINK LARGE QUANTITIES OF WATER OR VEGETABLE OIL. SEEK IMMEDIATE MEDICAL ATTENTION.
THE BATTERIES PRODUCE EXPLOSIVE GAS; KEEP THEM AWAY FROM OPEN FLAMES, SPARKS AND CIGARETTES. IF THE BATTERY IS CHARGED IN A CLOSED PLACE, TAKE CARE TO ENSURE ADEQUATE VENTILATION. ALWAYS PROTECT THE EYES WHEN WORKING CLOSE TO BATTERIES.
KEEP OUT OF REACH OF CHILDREN

CAUTION

NEVER USE FUSES WITH A CAPACITY HIGHER THAN THE RECOMMENDED CAPACITY. USING A FUSE OF UNSUITABLE RATING MAY SERIOUSLY DAMAGE THE scooter OR EVEN CAUSE A FIRE.

Levels check

Level checks:

- Hydraulic brake system liquid level.
- Oil level rear hub.

- Engine coolant level.

Road test

Test ride

- Cold start
- Instrument operations
- Response to the gas command
- Stability in acceleration and braking
- Rear and front brake efficiency
- Rear and front suspension efficiency
- Abnormal noise

Static test

Static control after the test ride:

- Starting when warm
- Function of the starter
- Run the engine at idle speed (turning the handlebar)
- Uniform turning of the steering
- Possible leaks

CAUTION

CHECK AND ADJUST TYRE PRESSURE WITH TYRES AT AMBIENT TEMPERATURE.

CAUTION

NEVER EXCEED THE RECOMMENDED INFLATING PRESSURES AS THE TYRES MAY BURST.

Functional inspection

Functional check up:

Brake system (hydraulic)

- Lever travel

Brake system (mechanical)

- Lever travel

Clutch

- Proper functioning check

Engine

- Throttle travel check

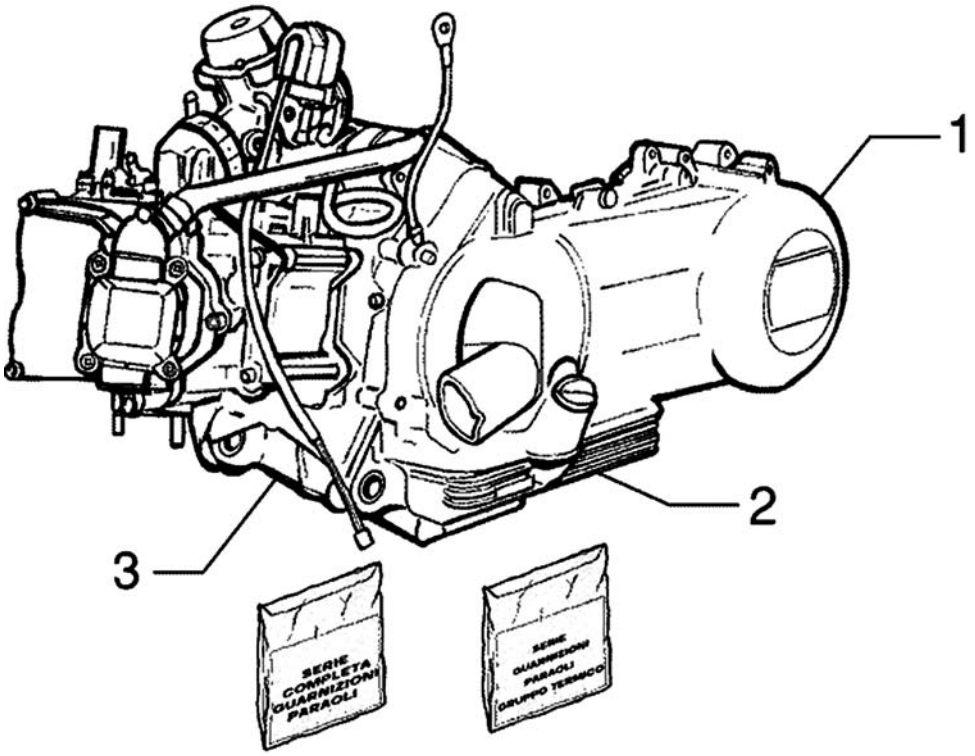
Others

- Check documentation
- Check the chassis and engine numbers
- Tool kit
- License plate assembly
- Check locks
- Check tyre pressures
- Installation of mirrors and any accessories

INDEX OF TOPICS

TIME	TIME

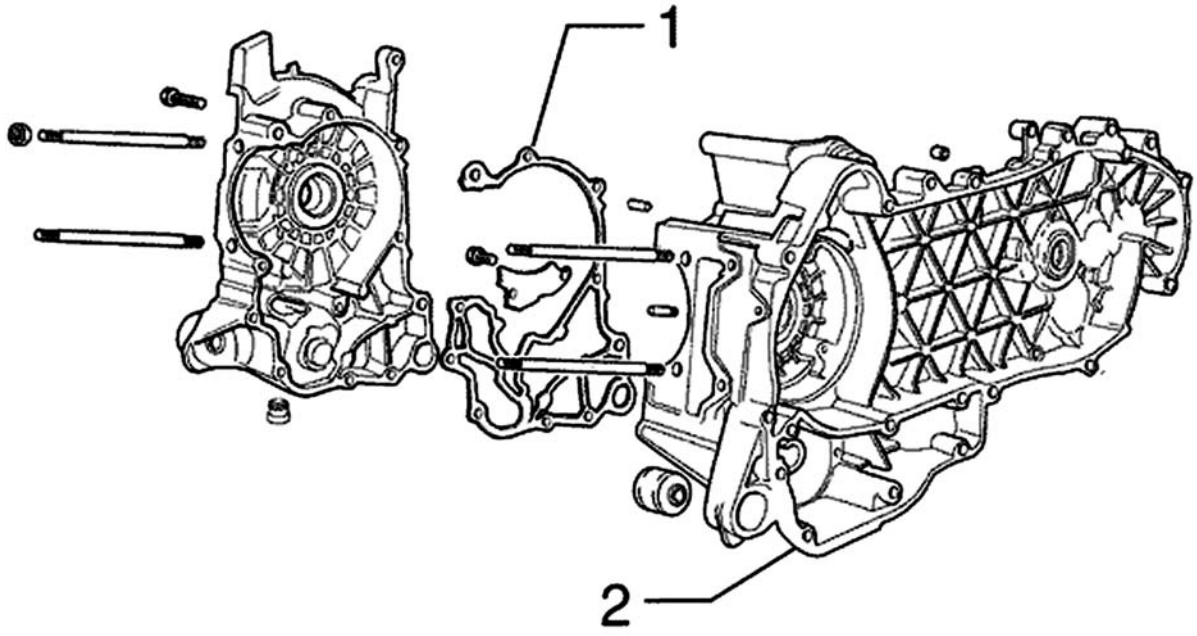
Engine



ENGINE

	Code	Action	Duration
1	001001	Engine from frame - Removal and reinstallation	
2	003064	Engine oil - Renewal	
3	003057	Engine anchorage - Tightening of nuts	

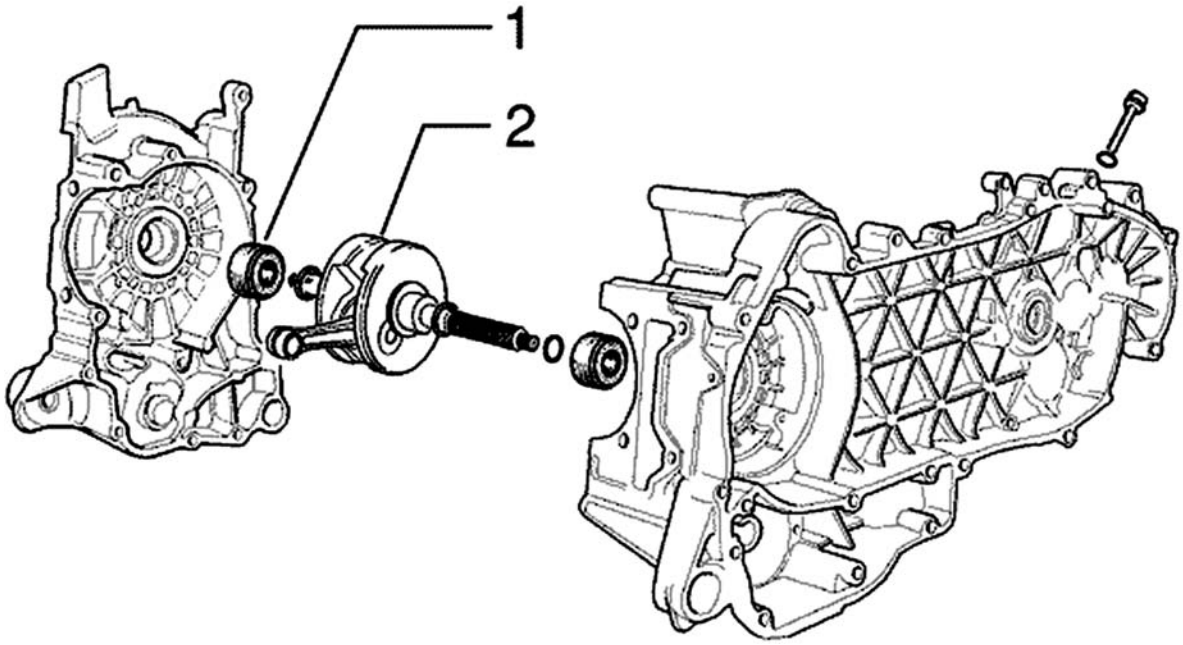
Crankcase



CRANKCASE

	Code	Action	Duration
1	001153	Half crankcase gasket - change	
2	001133	Crankcase - Replacement	

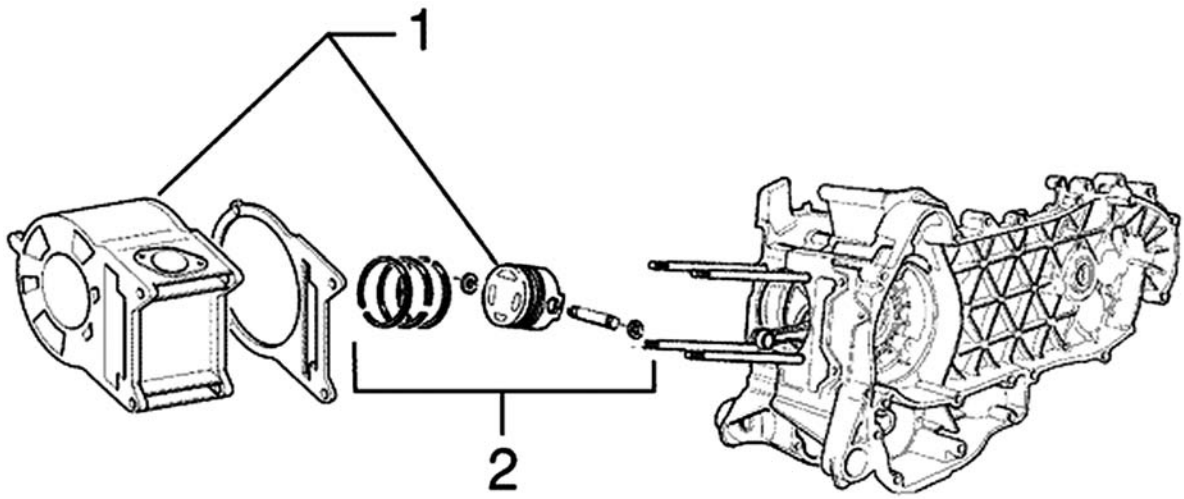
Crankshaft



DRIVE SHAFT

	Code	Action	Duration
1	001099	Oil seal, flywheel side - Replacement	
2	001117	Crankshaft - Replacement	

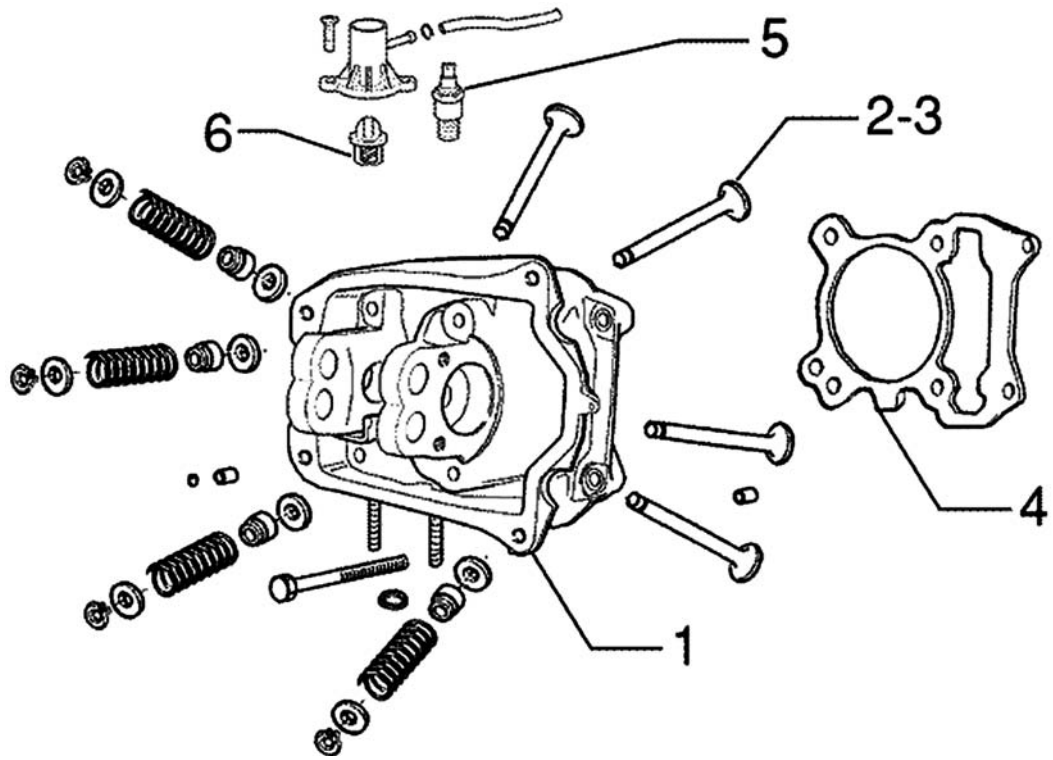
Cylinder assy.



CYLINDER - PISTON - PISTON PIN ASSEMBLY

	Code	Action	Duration
1	001002	Cylinder-piston - Replacement	
2	001154	Piston-piston rings-piston pin assembly - Overhaul	

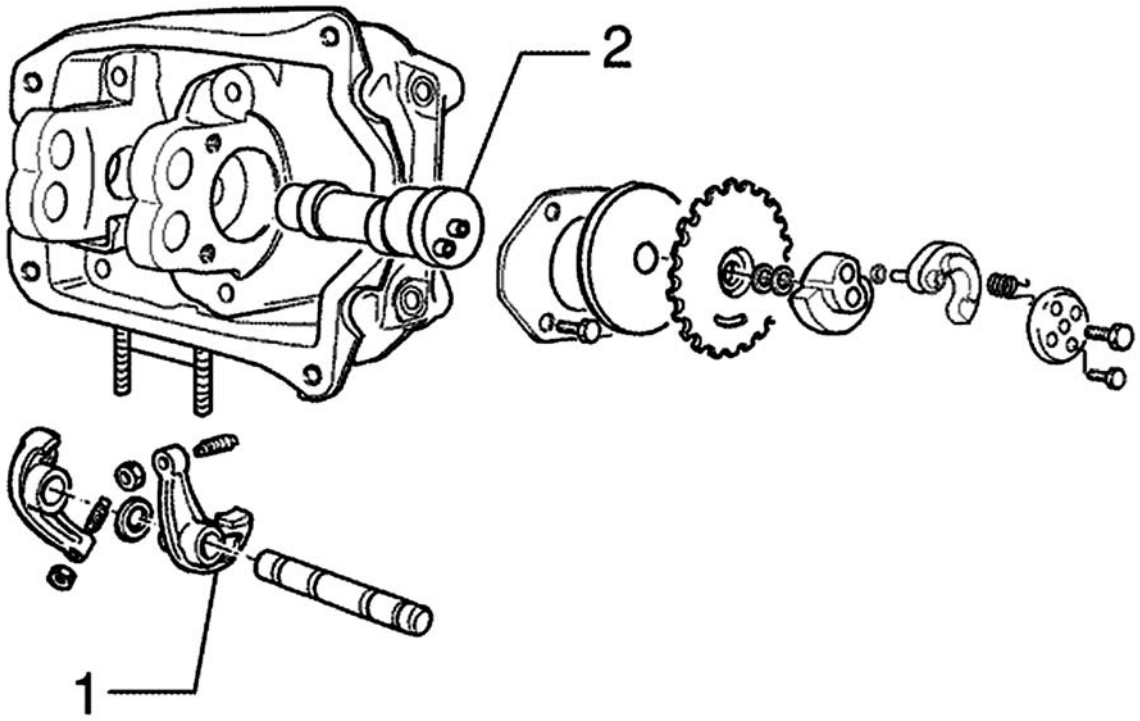
Cylinder head assy.



CYLINDER HEAD - VALVES ASSEMBLY

	Code	Action	Duration
1	001126	Cylinder head - Replacement	
2	001045	Valves - Replacement	
3	001049	Valves - adjust	
4	001056	Cylinder head gasket - Replacement	
5	001083	Thermistor - Replacement	
6	001057	Thermostat - Replacement	

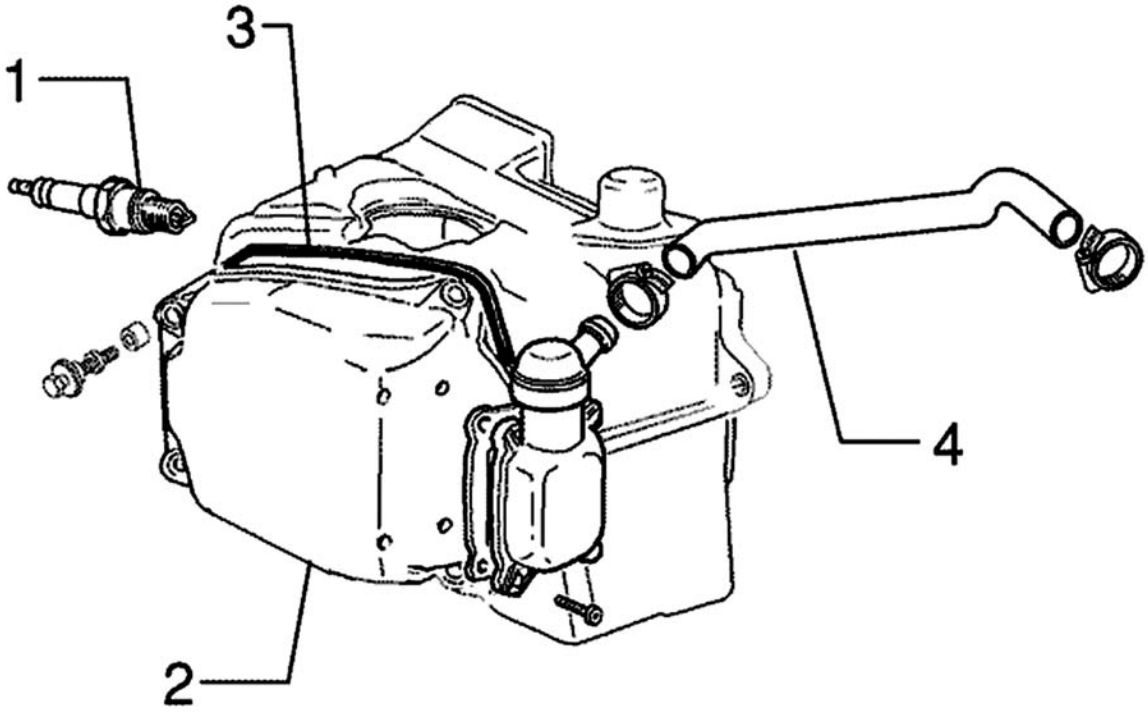
Rocker arms support assy.



CAMSHAFT - EQUALIZERS

	Code	Action	Duration
1	001148	Valve rocker arms - Replacement	
2	001044	Camshaft - Replacement	

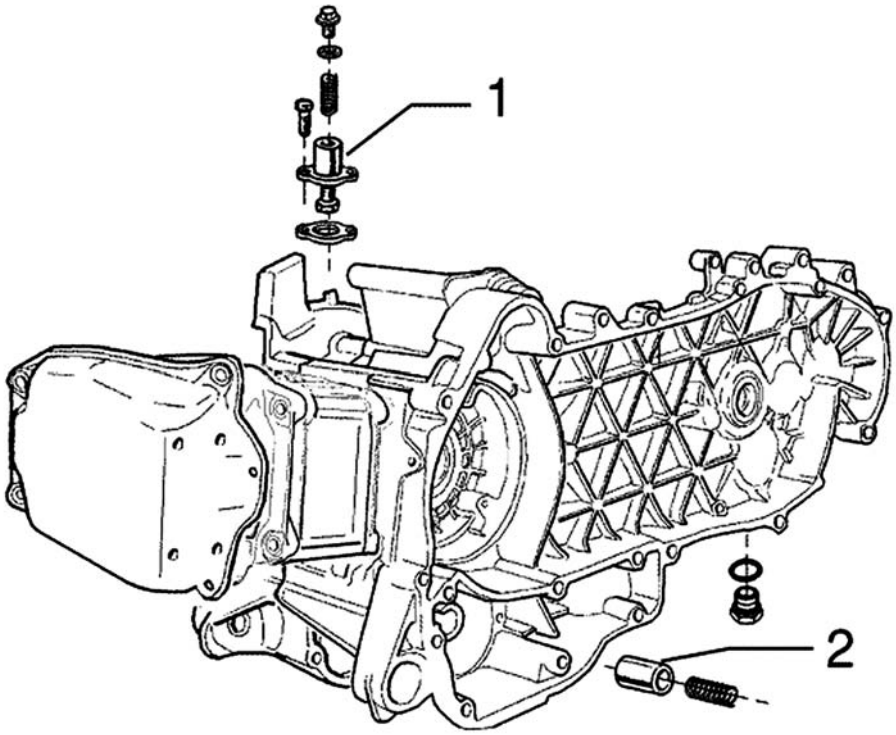
Cylinder head cover



HEAD COVER

	Code	Action	Duration
1	001093	Spark plug - change	
2	001089	Cylinder head cover - Replacement	
3	001088	Cylinder head cover gasket - Replacement	
4	001074	Oil vapour scavenge pipe - Replacement	

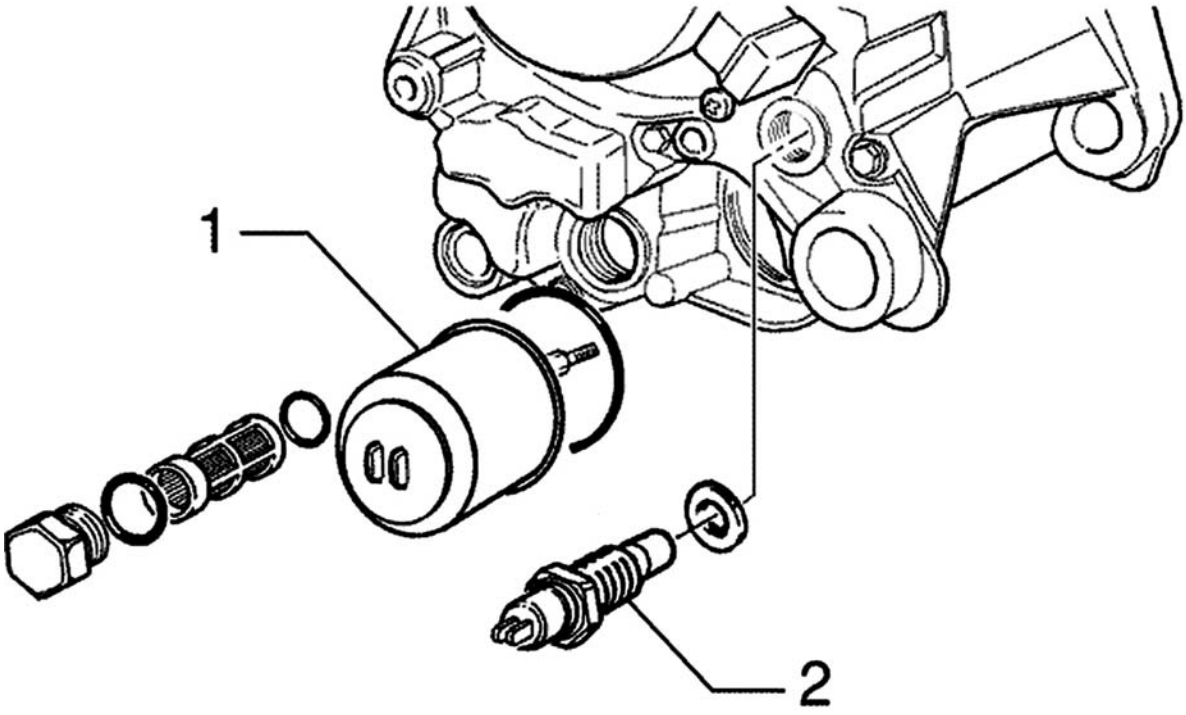
Chain tensioner



CHAIN TENSIONER - BY-PASS VALVE

	Code	Action	Duration
1	001129	Chain stretcher - Overhaul and replacement	
2	001124	By-pass - Lubrication and replacement	

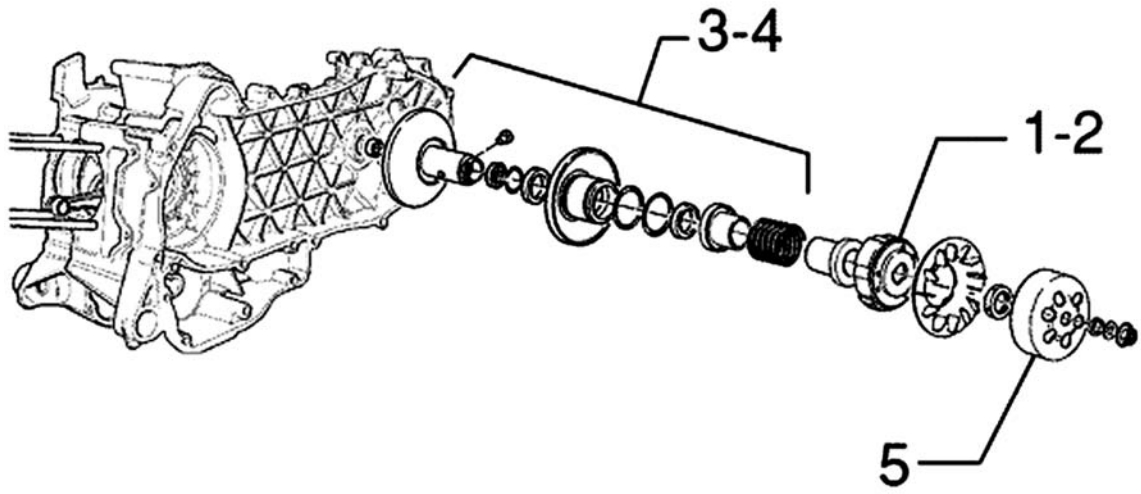
Oil filter



OIL FILTER

	Code	Action	Duration
1	001123	Oil filter - Replacement	
2	001160	Oil pressure sensor - Replacement	

Driven pulley

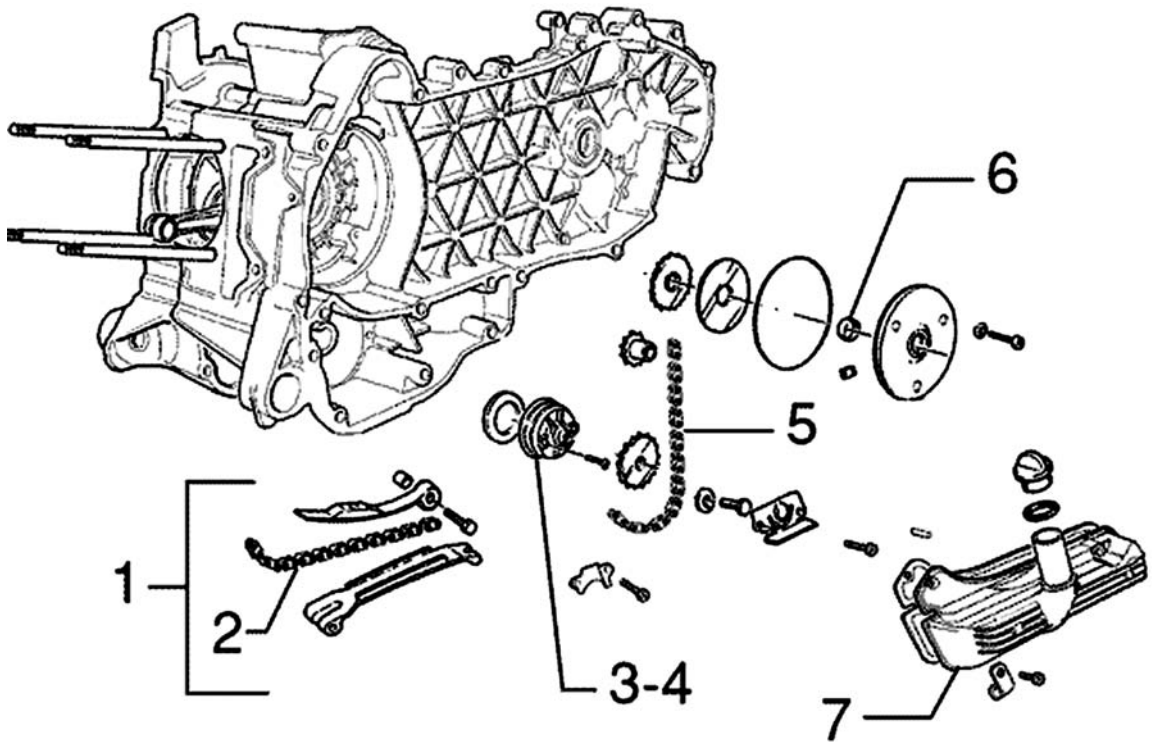


DRIVEN PULLEY

	Code	Action	Duration
1	001022	Clutch - change	
2	003072	Clutch assembly - Wear	

	Code	Action	Duration
		check	
3	001012	Driven pulley - overhaul	
4	001110	Driven pulley- change	
5	001155	Clutch bell - change	

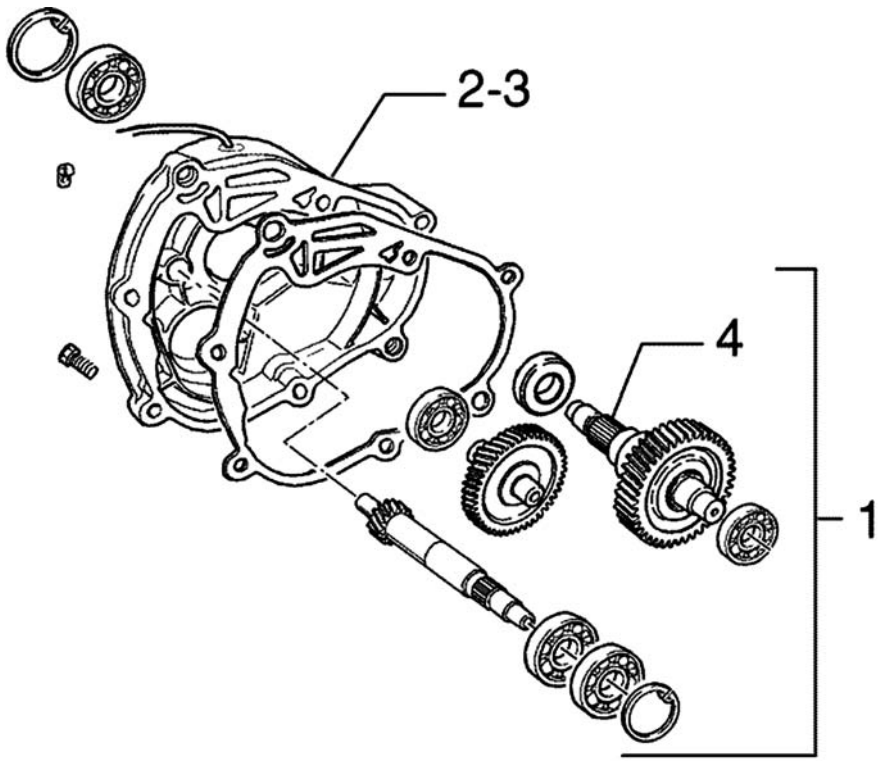
Oil pump



OIL PUMP - OIL SUMP

	Code	Action	Duration
1	001125	Chain guide shoes - Replacement	
2	001051	Timing chain/belt - Replacement	
3	001042	Oil pump - Overhaul	
4	001112	Oil pump - Replacement	
5	001122	Oil pump chain - Replacement	
6	001121	Chain guide shoes - Replacement	
7	001130	Oil sump - Replacement	

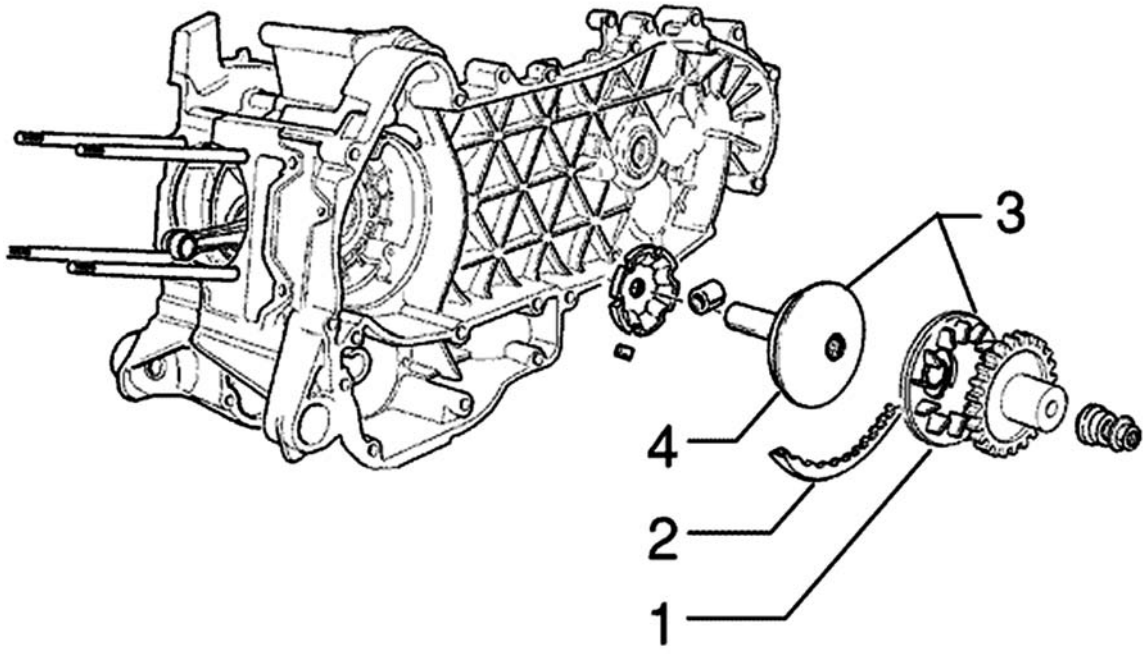
Final gear assy.



FINAL TRANSMISSION

	Code	Action	Duration
1	001010	Reduction gearing - Overhaul	
2	001156	Reduction gearing cover - Replacement	
3	003065	Gear box oil - change	
4	004125	Axis posterior wheel - Substitution	

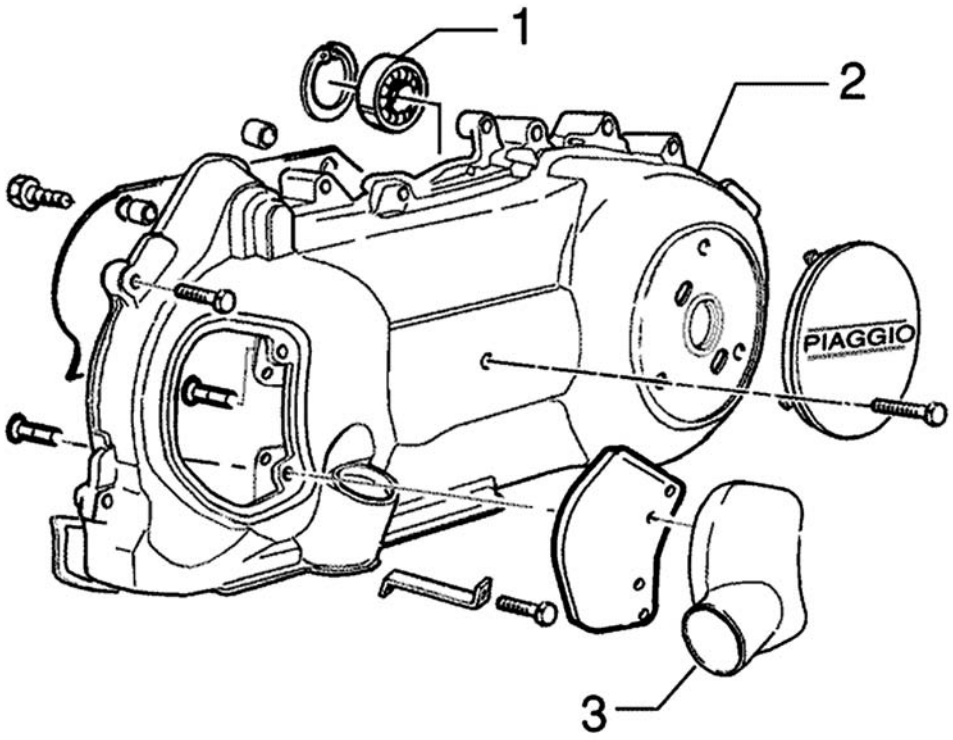
Driving pulley



DRIVING PULLEY

	Code	Action	Duration
1	001086	Driving half pulley - Replacement	
2	001011	Drive belt - Replacement	
3	001066	Driving pulley - Disassembly and reassembly	
4	001006	Driving pulley - Overhaul	

Transmission cover

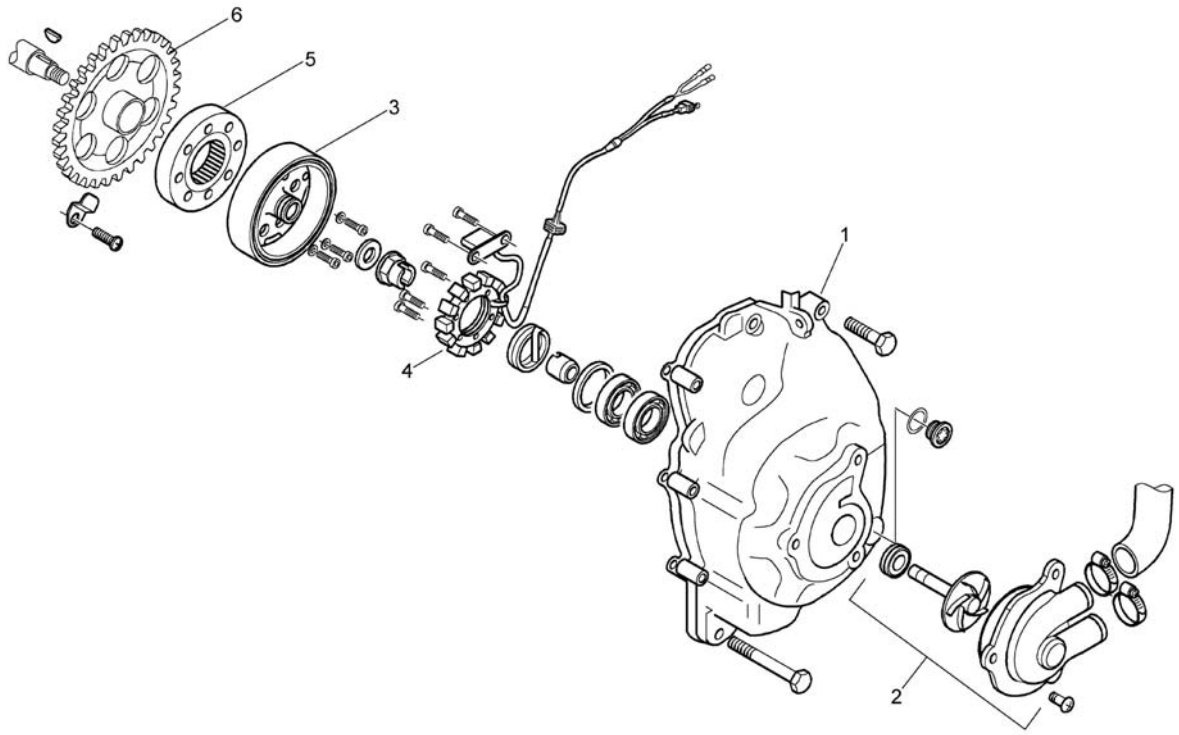


TRANSMISSION COVER

	Code	Action	Duration
1	001135	Transmission cover bearing - Replacement	
2	001096	Transmission casing cover - Replacement	
3	001131	Transmission air intake - change	

Flywheel magneto

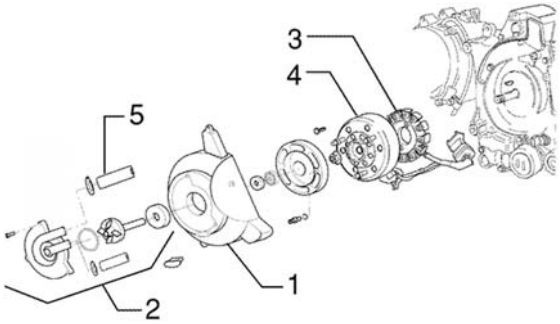
Versione 250



FLYWHEEL MAGNETO

	Code	Action	Duration
1	001087	Flywheel cover - Replacement	
2	001113	Water pump - change	
3	001173	Rotor - Replacement	
4	001067	Stator - Replacement	
5	001104	Starter free wheel - Replacement	
6	001151	Starter gearing - change	

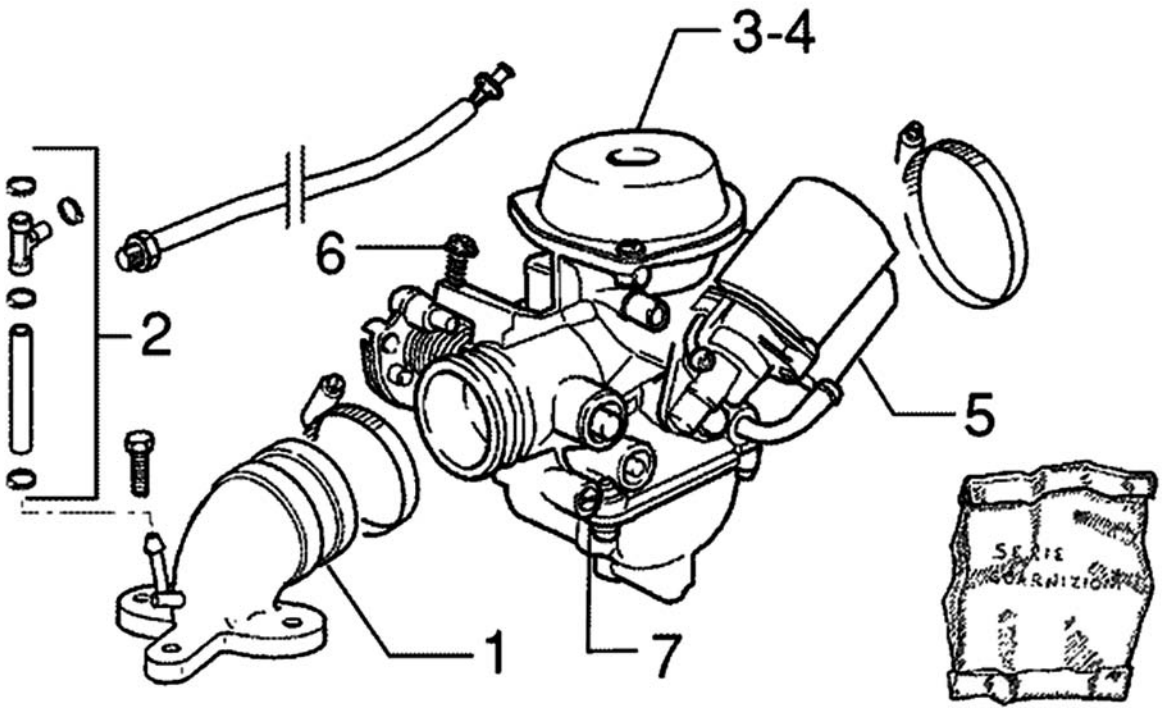
Versione 125



FLYWHEEL MAGNETO AND SECONDARY AIR

	Code	Action	Duration
1	001087	Flywheel cover - Replacement	
2	001113	Water pump - change	
3	001058	Flywheel - change	
4	001173	Rotor - Replacement	
5	001067	Stator - Replacement	
6	001161	Secondary air filter - Replacement / cleaning	
7	001162	Secondary air box - Replacement	
8	001174	SAS valve - Replacement	
9	001163	SAS valve - head union - Replacement	

Carburettor

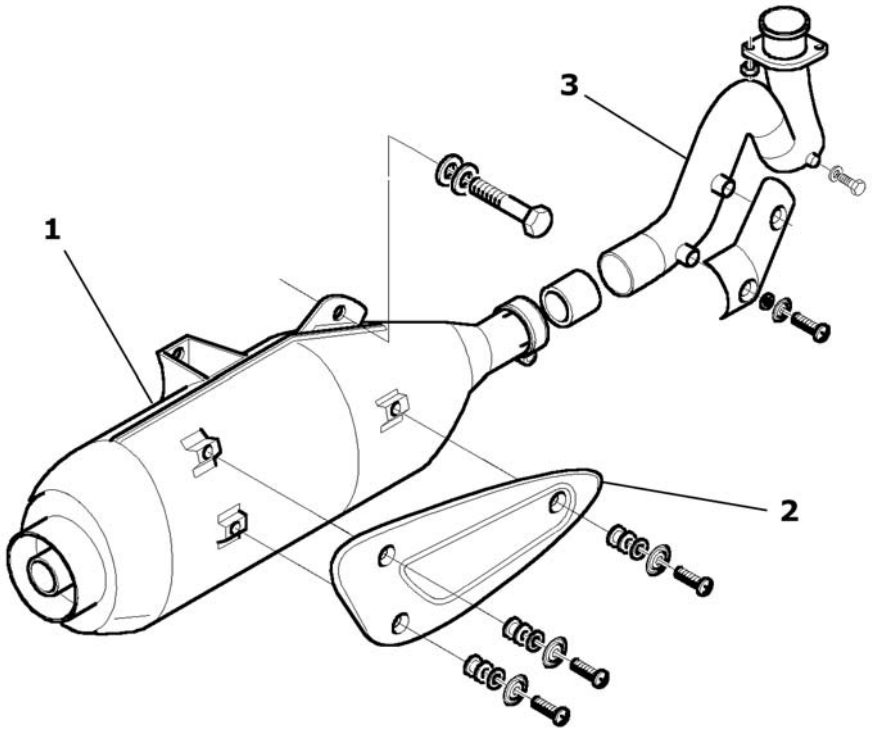


CARBURETTOR

	Code	Action	Duration
1	001013	Intake manifold - Replacement	
2	007020	Carburettor heating tubes - Replacement	
3	001008	Carburettor - Overhaul	

	Code	Action	Duration
4	001063	Carburettor - Replacement	
5	001081	Automatic starting device - Replacement	
6	003058	Carburettor - Tuning	
7	001136	Exhaust emissions - Adjustment	

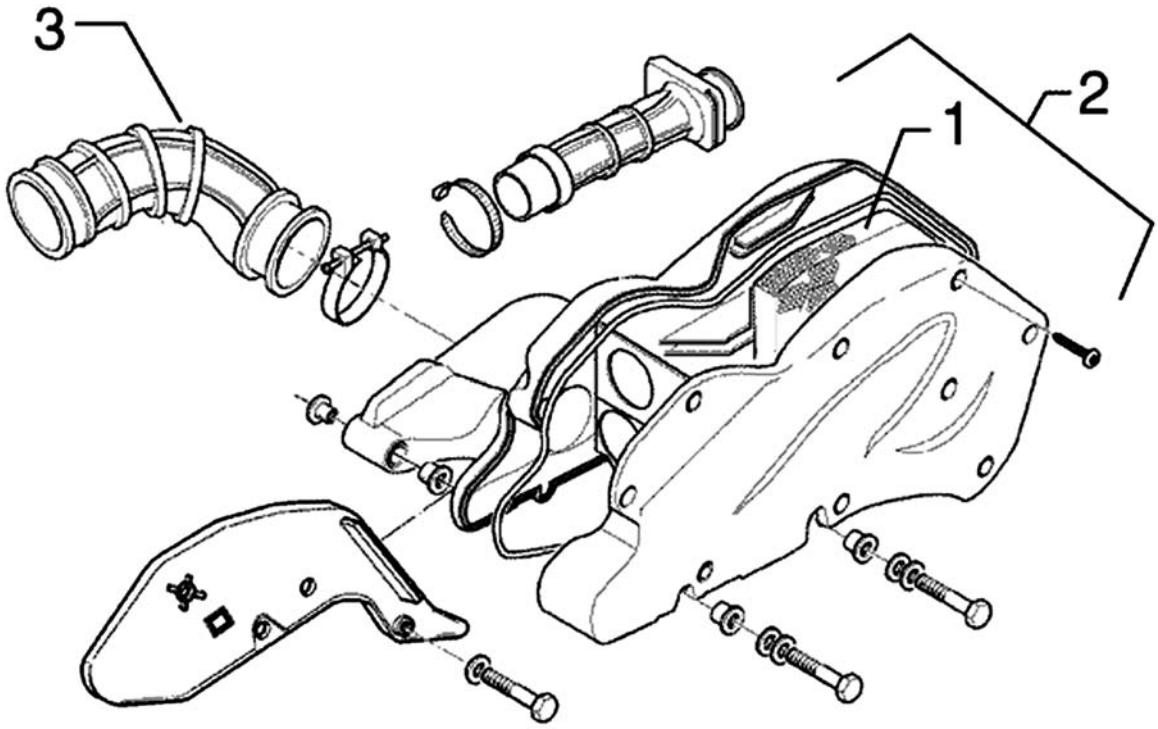
Exhaust pipe



SILENCER

	Code	Action	Duration
1	001009	Exhaust pipe - Replacement	
2	001095	Muffler guard - change	
3	001092	Exhaust manifold - Replacement	

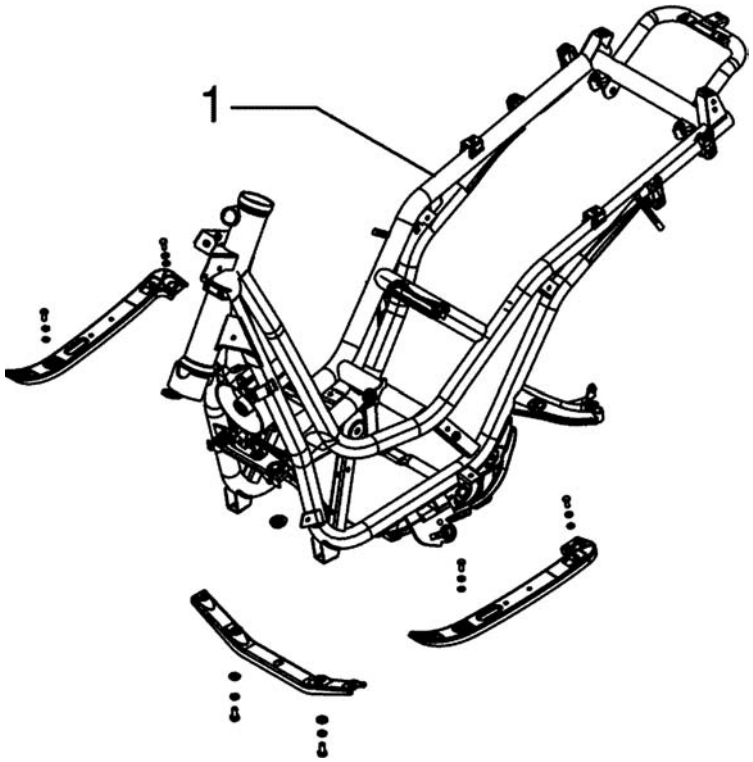
Air cleaner



AIR CLEANER

	Code	Action	Duration
1	001014	Air filter - Replacement/clean	
2	001015	Air filter box - change	
3	004122	Carburettor cleaner connection - Replacement	

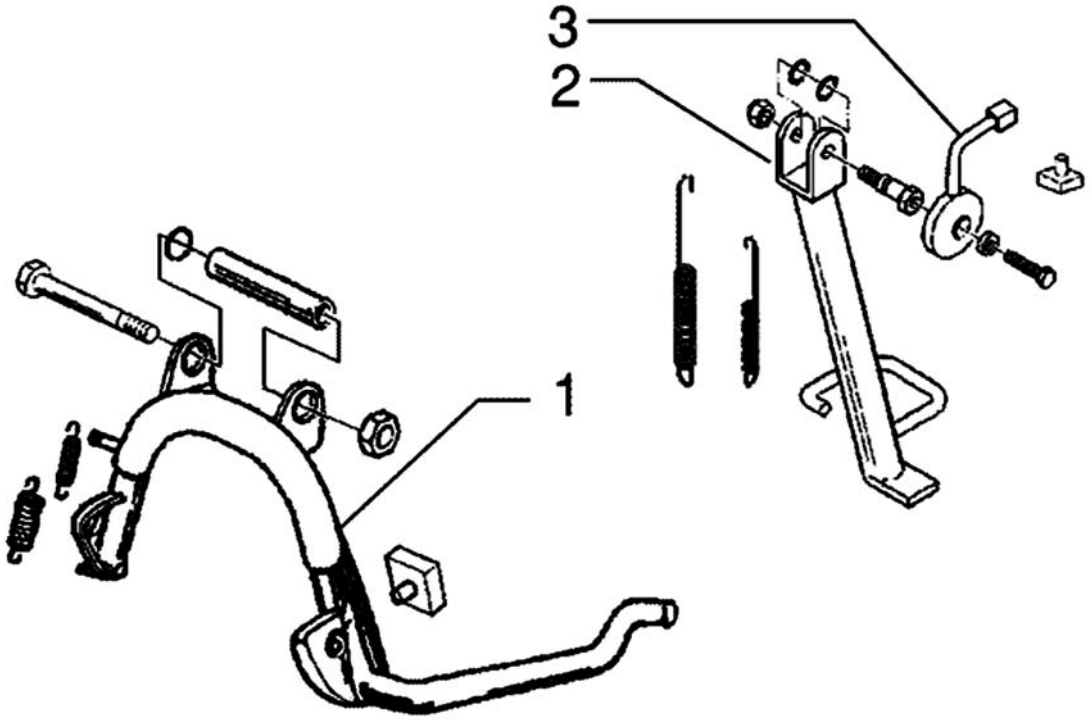
Frame



FRAME

	Code	Action	Duration
1	004001	Frame - Replacement	

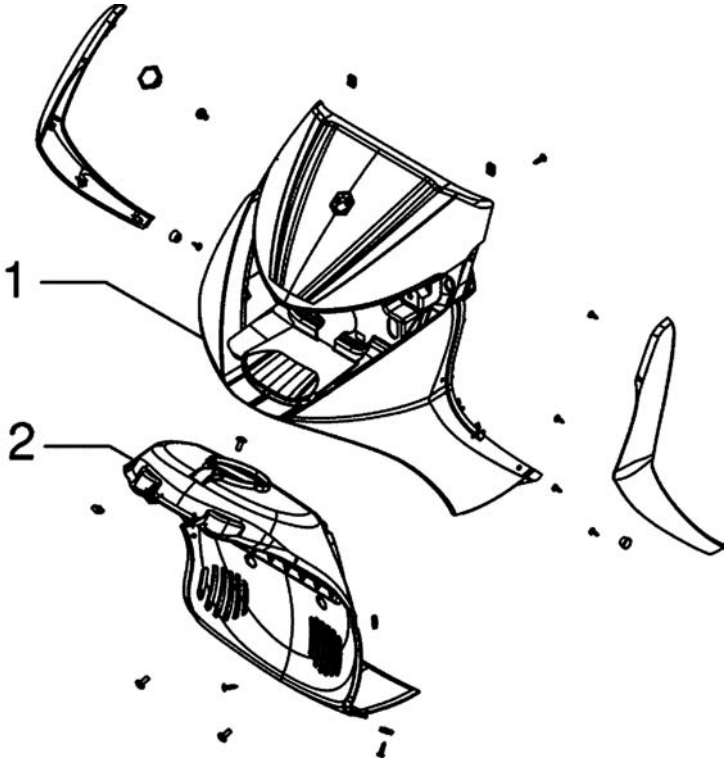
Centre-stand



SIDE CENTRAL STAND

	Code	Action	Duration
1	004004	Stand - change	
2	004102	Side stand - change	
3	005079	Stand switch - change	

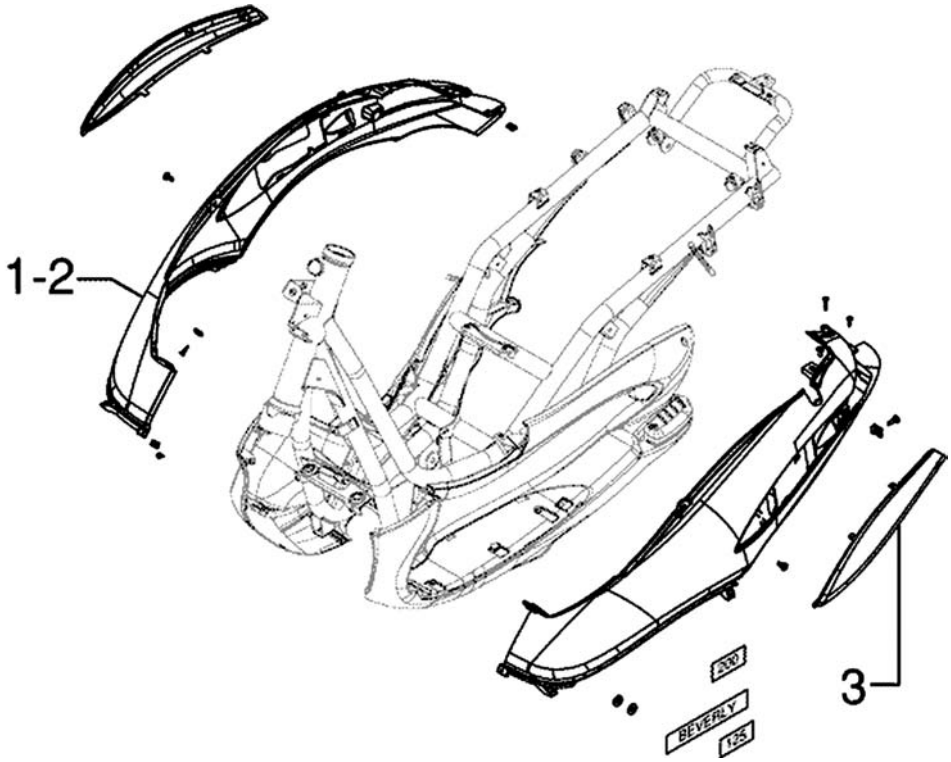
Legshield spoiler



FRONT SHIELD - SPOILER

	Code	Action	Duration
1	004064	Front shield - Replacement	
2	004053	Spoiler - Replacement	

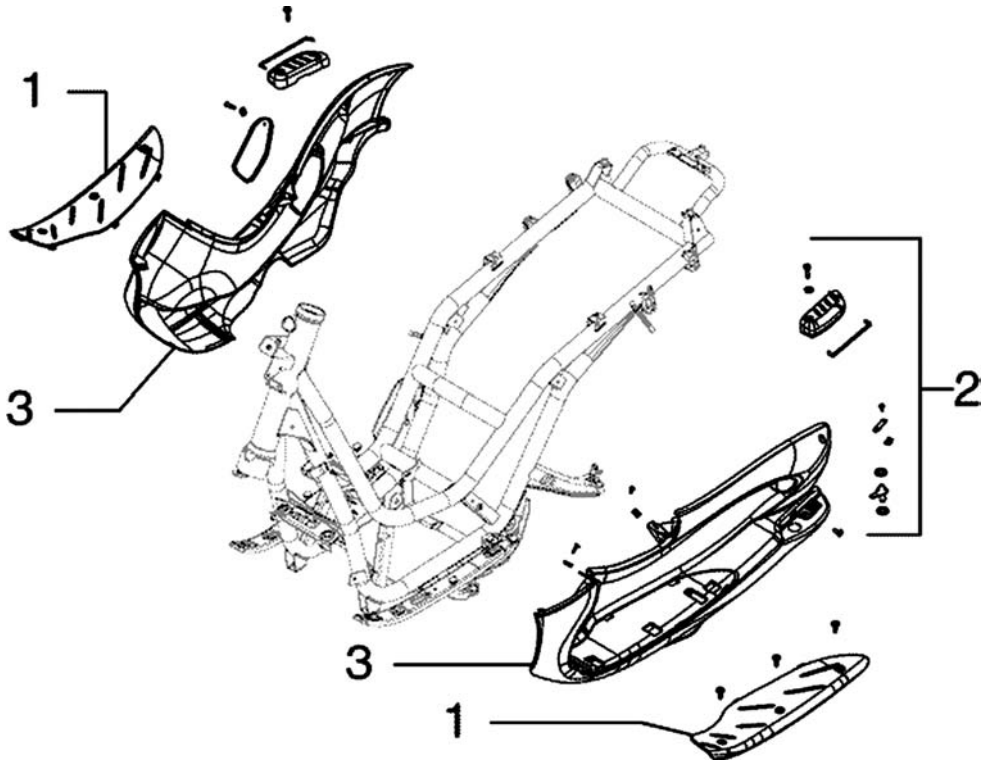
Side fairings



SIDE COVERS

	Code	Action	Duration
1	004085	Fairing (1) - Replacement	
2	004012	Rear side panels - change	
3	004052	Bumper - Replacement	

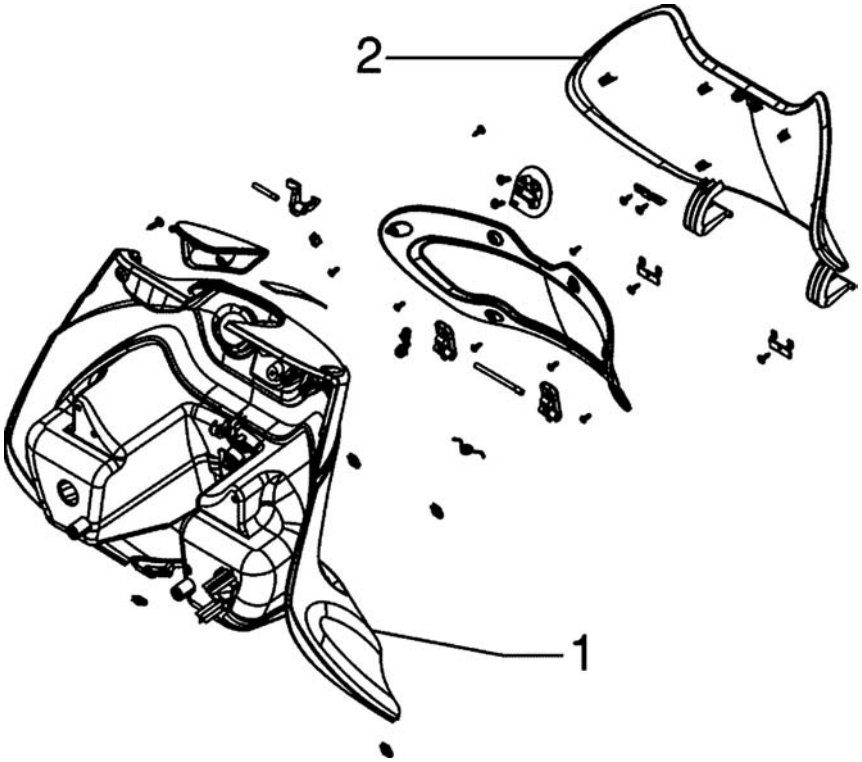
Footrests



MATS AND COVERS

	Code	Action	Duration
1	004075	Front mat - change	
2	004079	Passenger footrest (1) - change	
3	004015	Footrest - removal and installation	

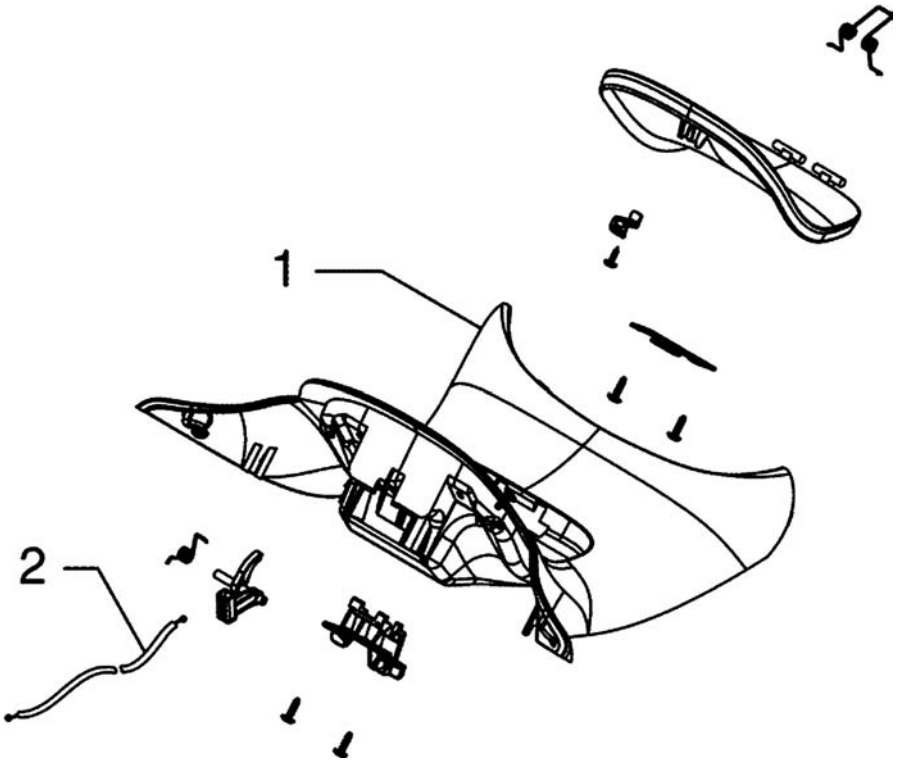
Rear cover



REAR SHIELD

	Code	Action	Duration
1	004065	Front shield rear section - removal and installation	
2	004081	Trunk flap - change	

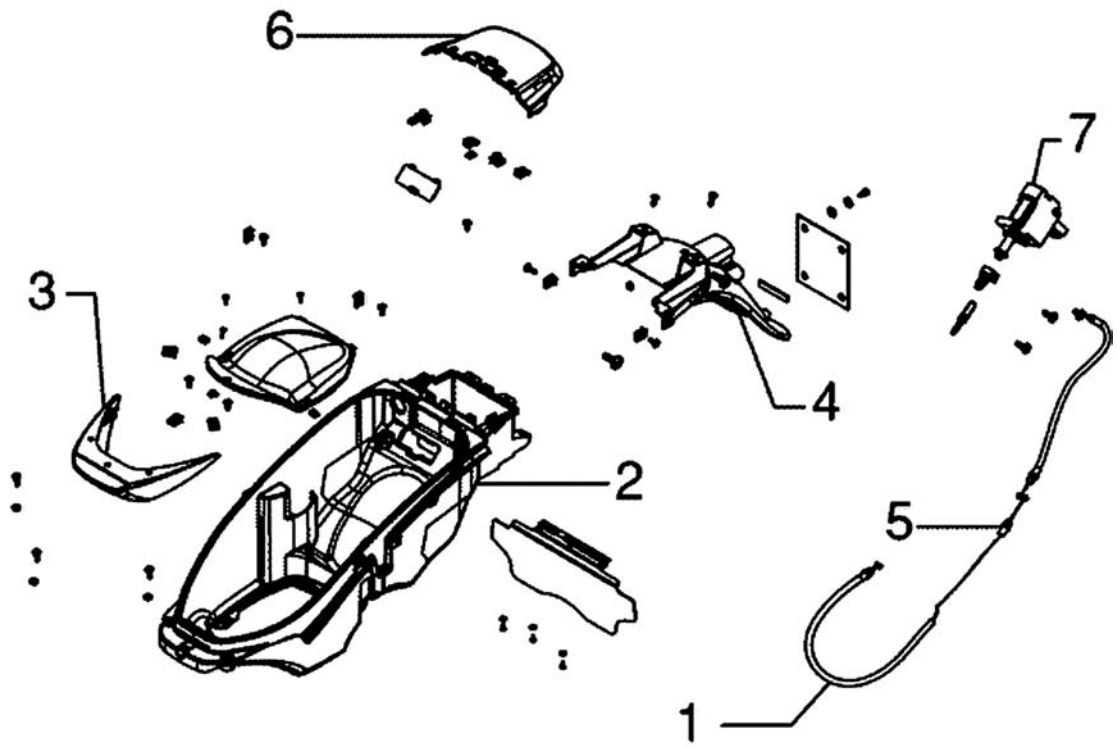
Central cover



CENTRAL COVER

	Code	Action	Duration
1	004011	Central frame cover - Replacement	
2	002082	Fuel tank door opening drive - change	

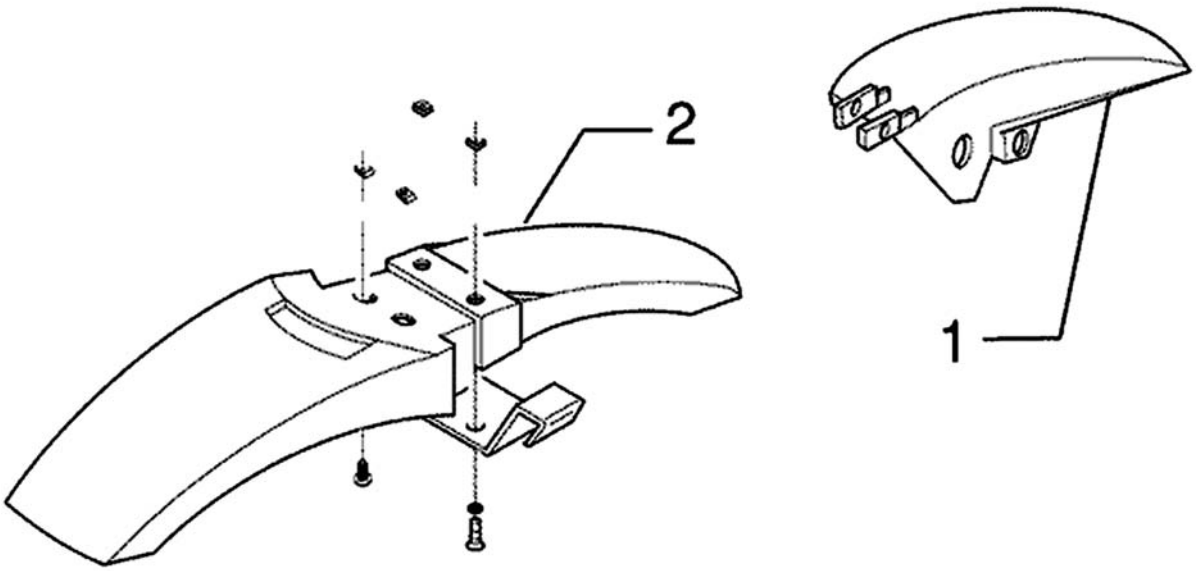
Underseat compartment



UNDER-SADDLE COMPARTMENT-ELECTRIC SEAT OPENING-LICENCE PLATE SUPPORT

	Code	Action	Duration
1	002083	Saddle opening transmission - replacement Saddle opening transmission - replacement	
2	004016	Helmet compartment - removal and installation	
3	004106	Underseat band - Replacement	
4	004136	License plate support - change	
5	004158	Saddle opening splitter - change	
6	005046	Battery cover - change	
7	005099	Electric saddle opening activator - change	

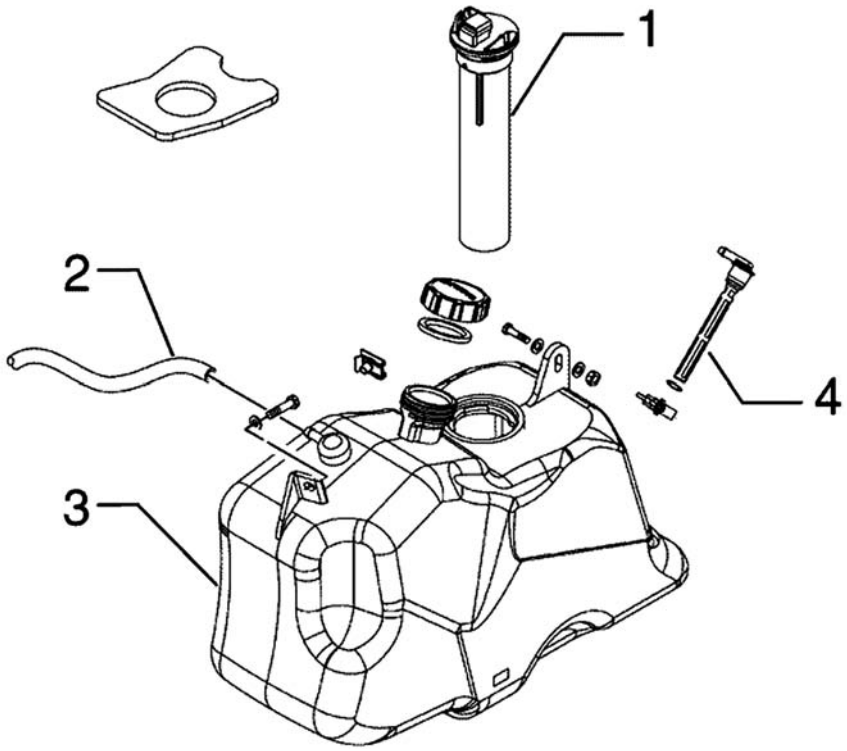
Mudguard



FRONT AND REAR MUDGUARDS

	Code	Action	Duration
1	004009	Rear mudguard - Replacement	
2	004002	Front mudguard - change	

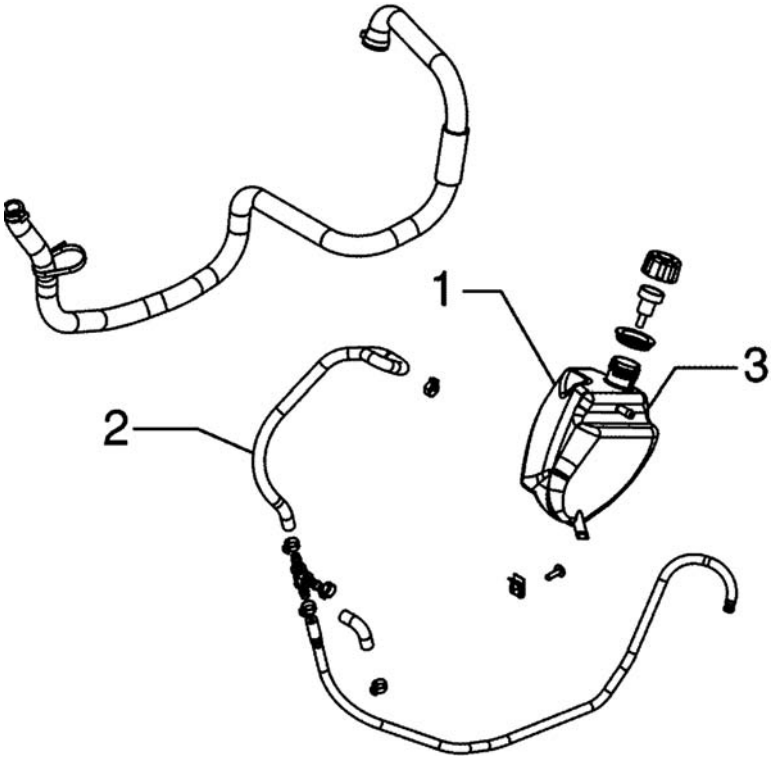
Fuel tank



FUEL TANK

	Code	Action	Duration
1	005010	Fuel tank float - Replacement	
2	004109	Fuel tank breather - Replacement	
3	004005	Fuel tank - Replacement	
4	004007	Fuel cock - Replacement	

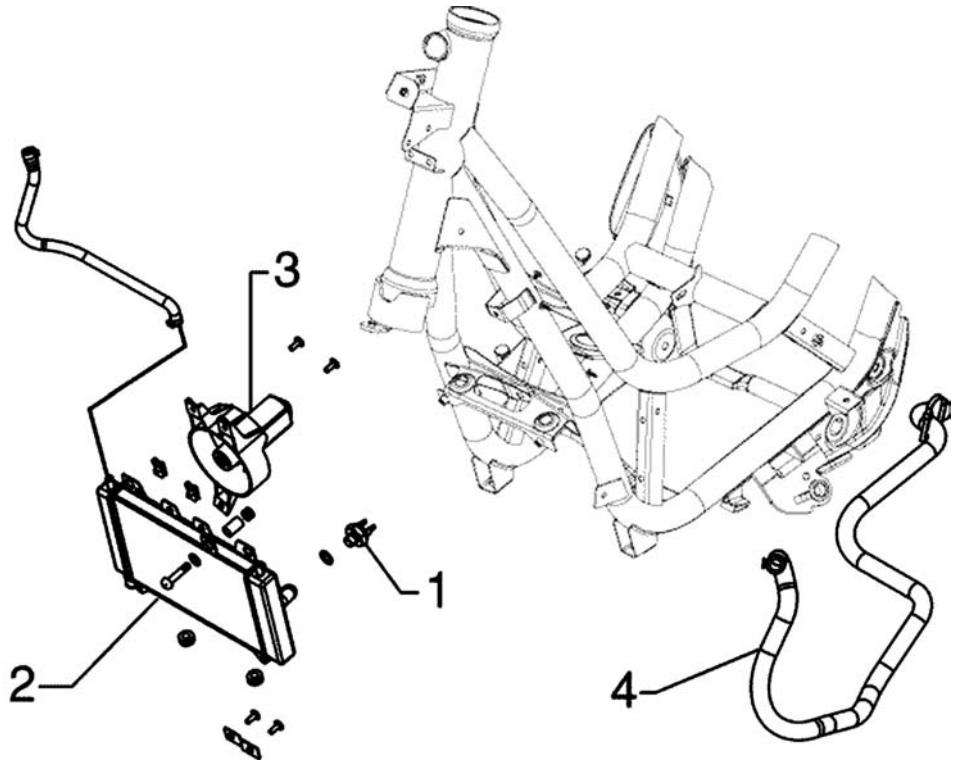
Expansion tank



EXPANSION TANK

	Code	Action	Duration
1	007001	Expansion tank - change	
2	007013	Radiator expansion tank connection pipe - change	
3	001052	Coolant and air bleeding - Change	

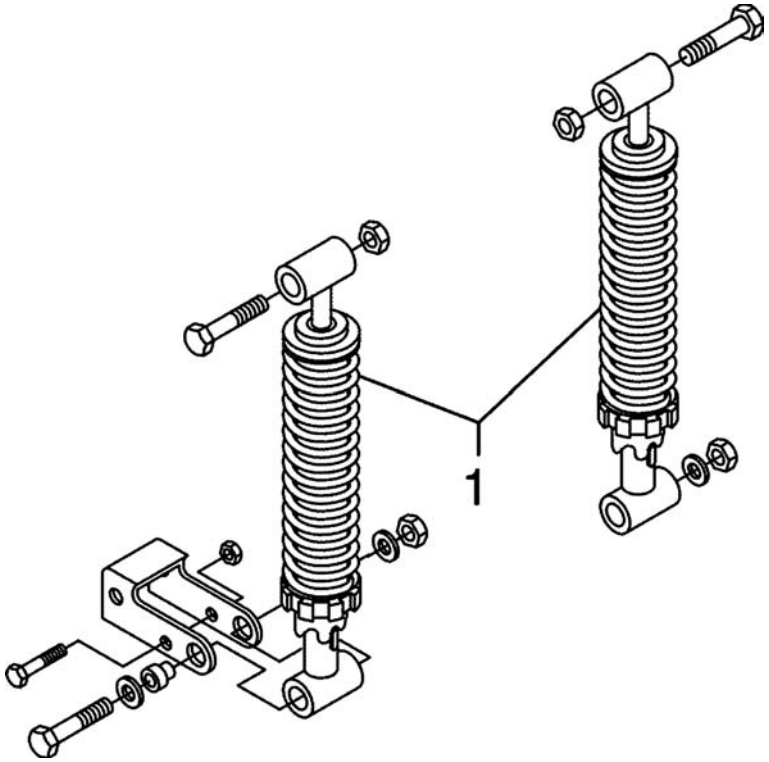
Radiator



RADIATOR

	Code	Action	Duration
1	007014	Radiator thermal switch - Replacement	
2	007002	Radiator water - Replacement	
3	007016	Complete fan with support - Replacement	
4	007003	Coolant delivery and return pipe - change	

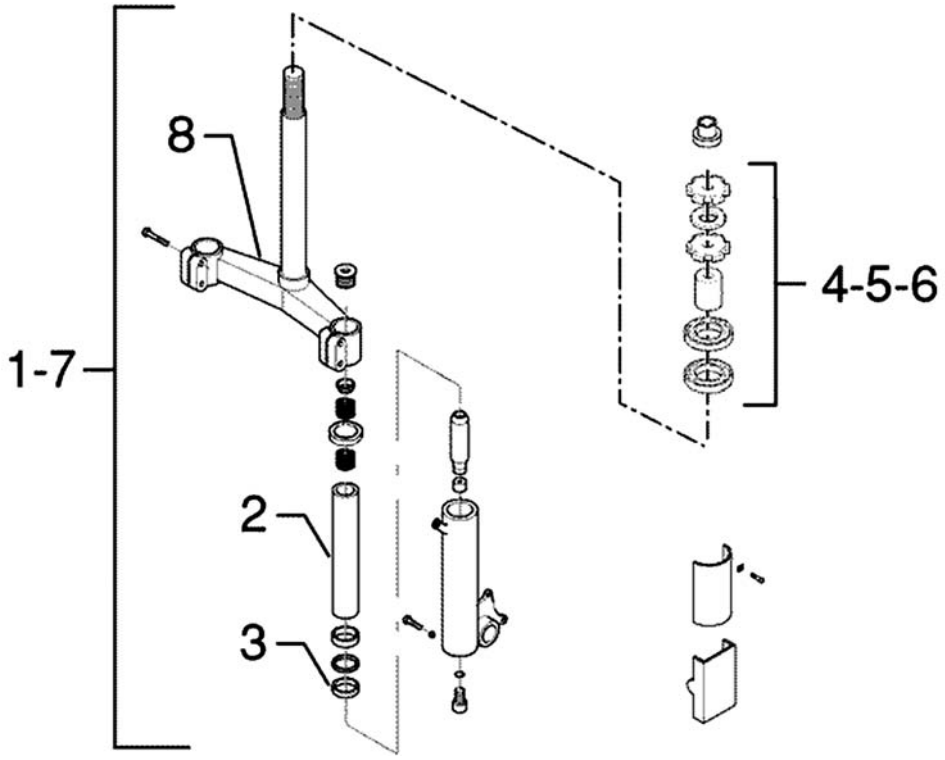
Rear shock-absorber



REAR SHOCK ABSORBER

	Code	Action	Duration
1	003007	Rear shock absorber - removal and installation	

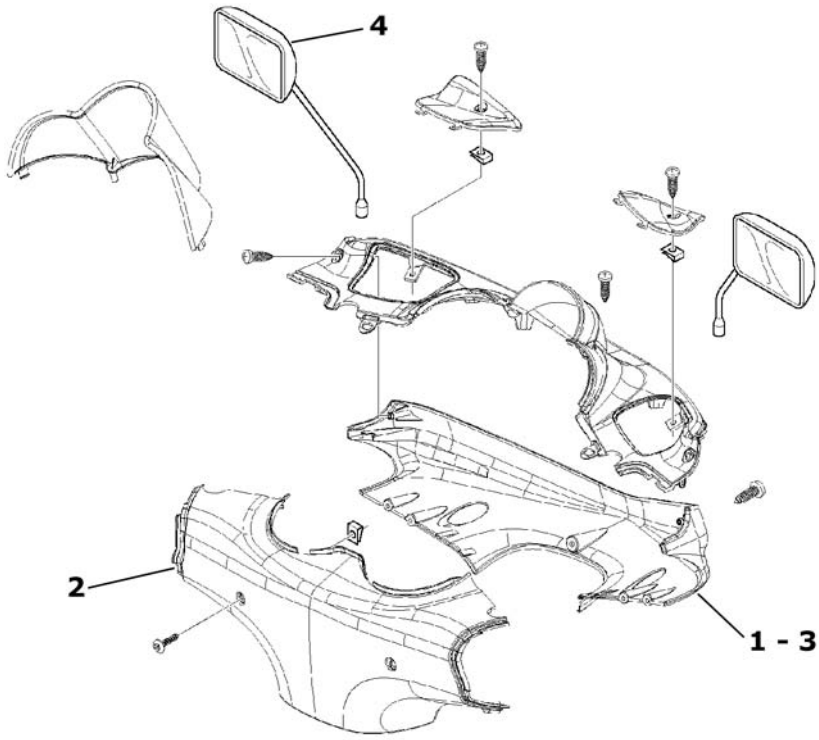
Steering column bearings



STEERING FIFTH WHEELS

	Code	Action	Duration
1	003051	Fork assembly - change	
2	003079	Fork stem - change	
3	003048	Fork oil seal - change	
4	004119	Bearing/upper steering fifth wheel - change	
5	003002	Steering fifth wheels - change	
6	003073	Steering backlash - adjust	
7	003010	Front suspension - overhaul	
8	003050	Fork lower plate - change	

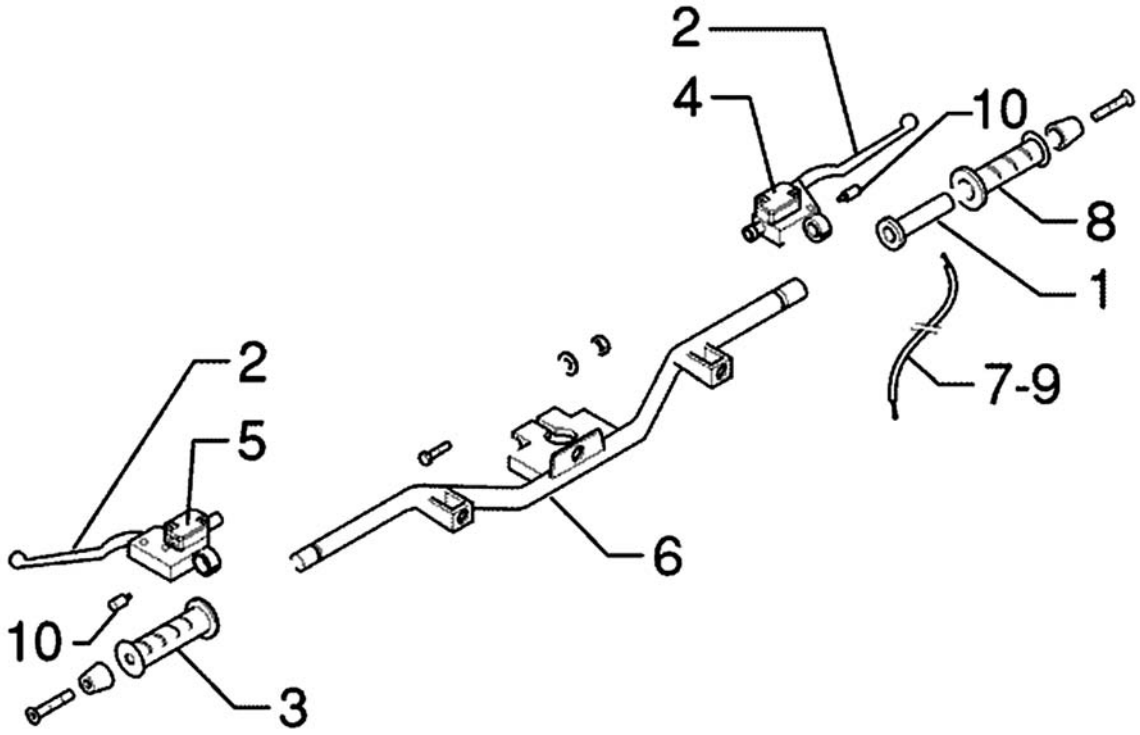
Handlebar covers



HANDLEBAR COVER

	Code	Action	Duration
1	004018	Handlebar front section - change	
2	004019	Handlebar rear section - Replacement	
3	006013	Front part of handlebar - Paintwork	
4	006014	Handlebar rear part - Painting	

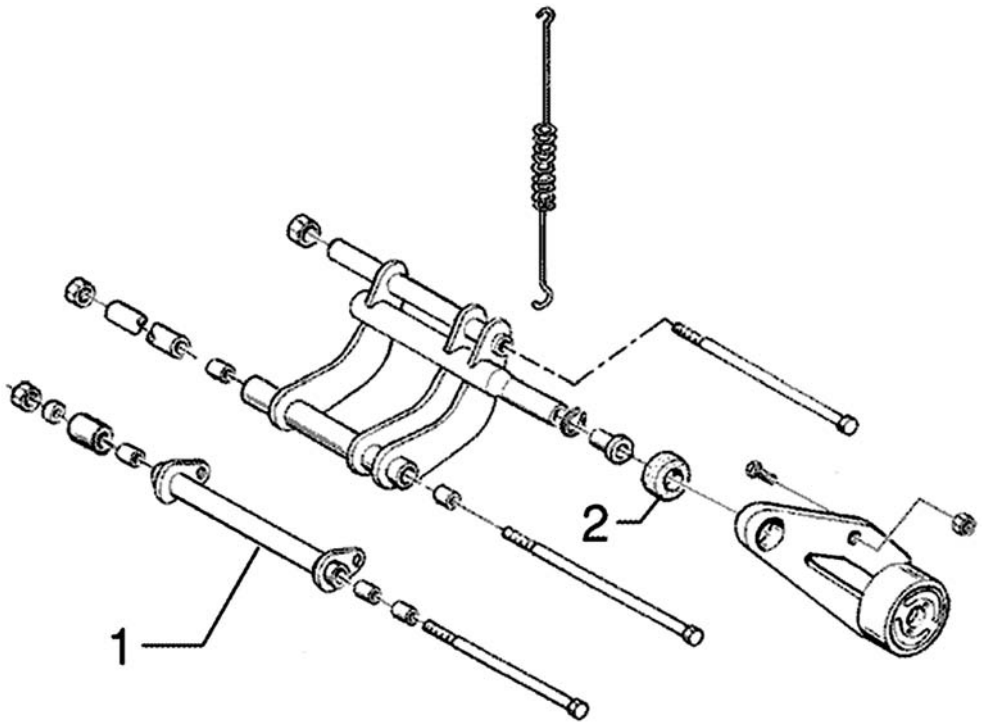
Handlebar components



HANDLEBAR COMPONENTS

	Code	Action	Duration
1	002060	Throttle grip - Replacement	
2	002037	Brake or clutch lever - change	
3	002071	L-H knob - change	
4	002024	Front brake pump - Removal and installation	
5	002067	Rear brake pump - Replacement	
6	003001	Handlebar- change	
7	002063	Complete throttle grip transmission - Replacement	
8	002059	Right-hand knob - change	
9	003061	Accelerator transmission - adjust	
10	005017	Stop switch - Replacement	

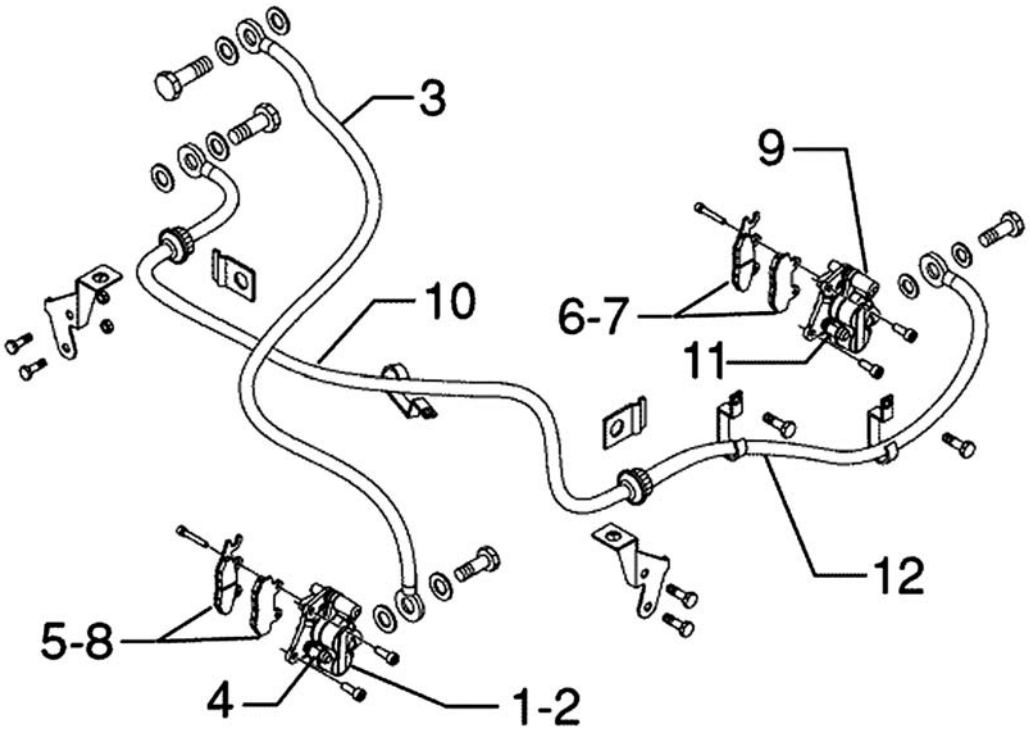
Swing-arm



SWINGING ARM

	Code	Action	Duration
1	001072	Engine-frame connection swinging arm - change	
2	004058	Silent bloc - change	

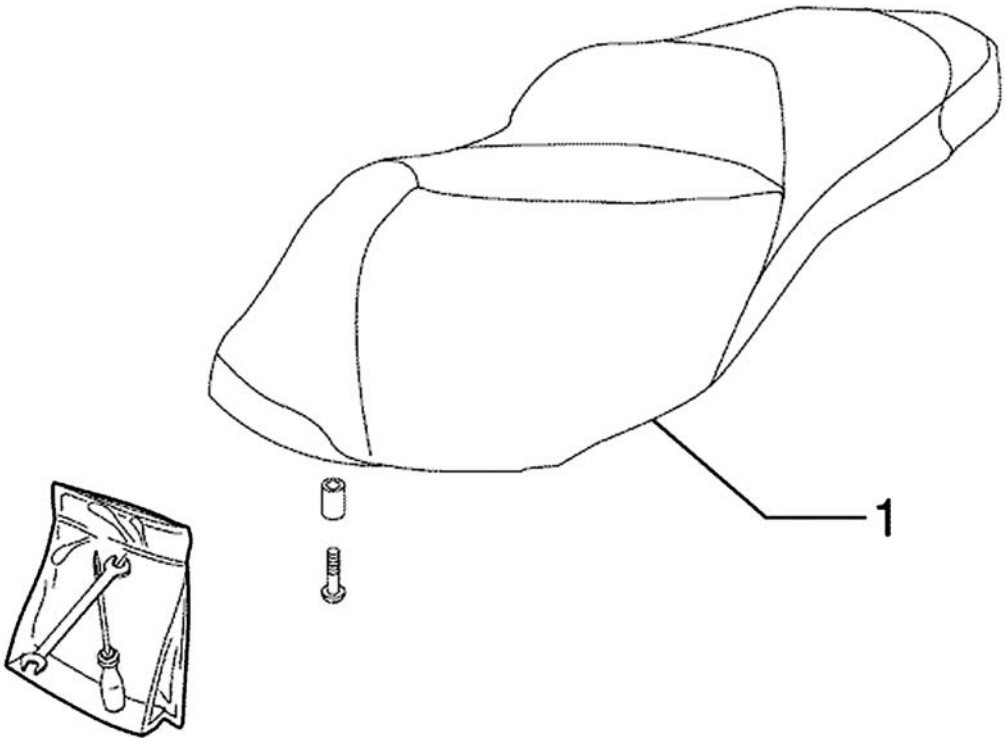
Brake hoses



BRAKE PIPING

	Code	Action	Duration
1	002039	Front brake calliper - change	
2	002040	Front brake calliper - Service	
3	002021	Front brake hose - change	
4	002047	Front brake fluid and system bleeding plug - Change	
5	003070	Front brake pads/shoes - check wear	
6	003071	Rear brake pads/shoes - check wear	
7	002002	Rear brake pads/shoes - Replacement	
8	002007	Front brake pads/shoes - removal and installation	
9	002048	Rear brake calliper - change	
10	002020	Rear brake pipework - removal and installation	
11	002080	Rear brake oil bleeding system - change	
12	002081	Rear brake piping - Replacement	

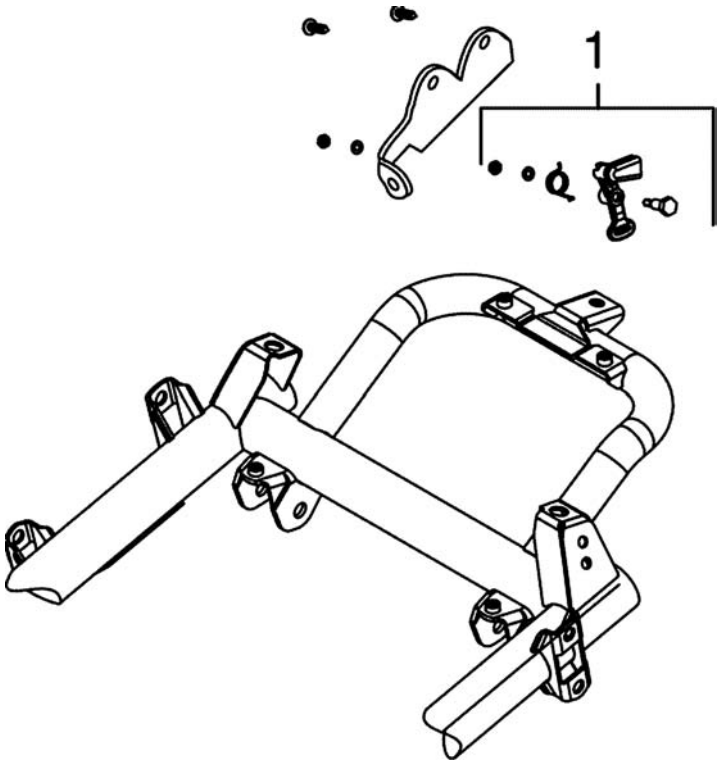
Seat



SADDLE

	Code	Action	Duration
1	004003	Saddle - change	

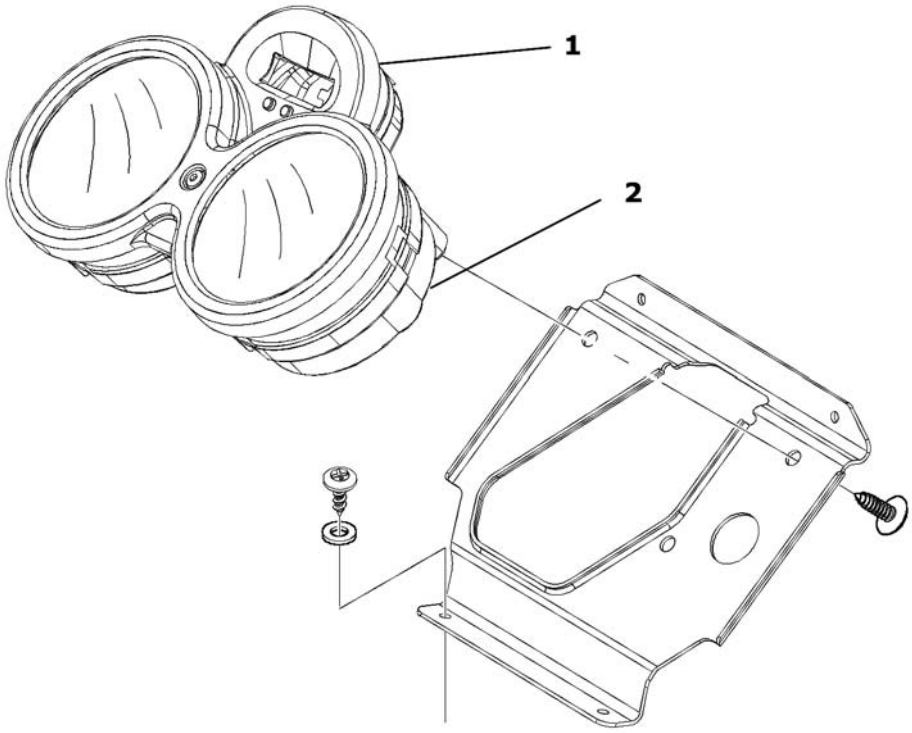
Seat lock



SADDLE LOCK

	Code	Action	Duration
1	004054	Saddle lock catch - change	

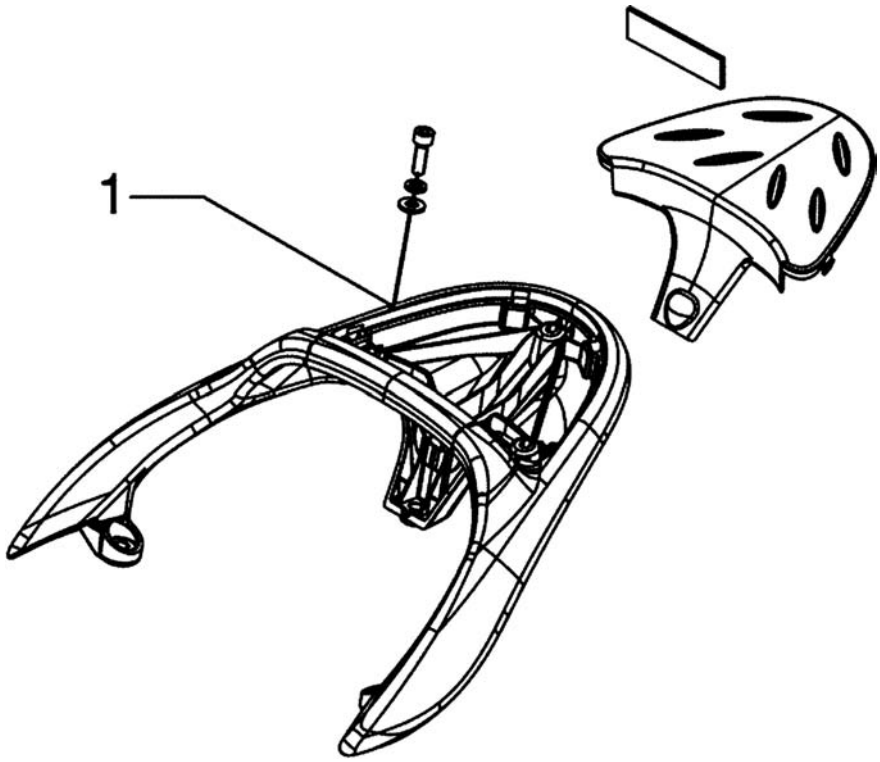
Instrument panel



INSTRUMENT PANEL

	Code	Action	Duration
1	005014	Odometer - Replacement	
2	005038	Dashboard warning lights - change	

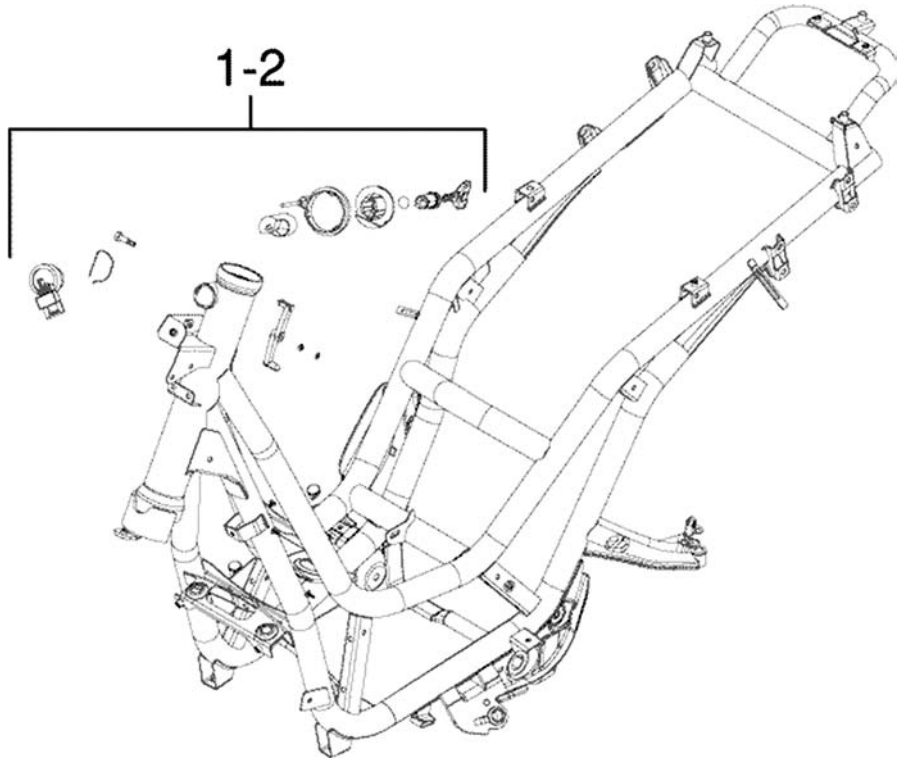
Rear rack



LUGGAGE RACK

	Code	Action	Duration
1	004008	Trunk rack - change	

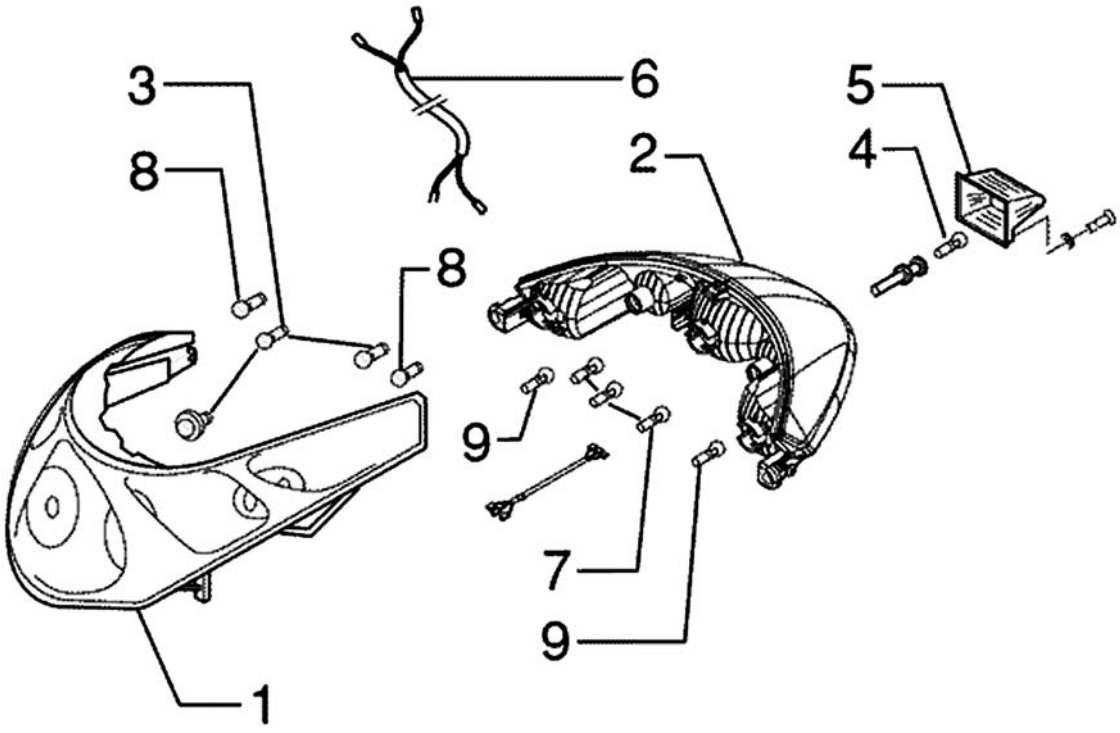
Locks



LOCKS

	Code	Action	Duration
1	005016	Ignition switch - change	
2	004010	Antitheft lock - change	

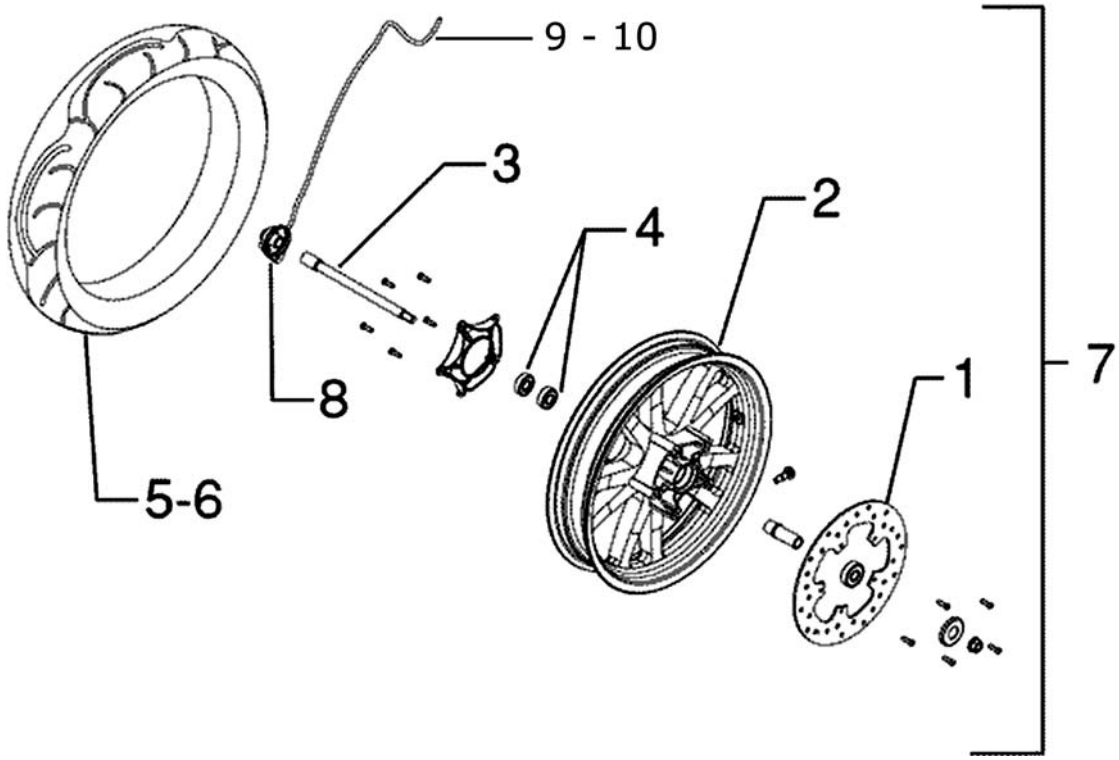
Turn signal lights



INDICATOR LIGHTS

	Code	Action	Duration
1	005002	Front light - change	
2	005005	Tail light - change	
3	005008	Front light bulbs - Replacement	
4	005031	Licence plate light bulb - change	
5	005032	Licence plate light glass - change	
6	005044	Front lights cable unit - change	
7	005066	Rear light bulbs - change	
8	005067	Front turn indicator light - Replacement	
9	005068	Rear turn indicator bulb - change	

Front wheel



FRONT WHEEL

	Code	Action	Duration
1	002041	Brake disc - change	
2	003037	Front wheel rim - removal and installation	
3	003038	Front wheel axle - removal and installation	
4	003040	Front wheel bearings - change	
5	003047	Front tyre - Replacement	
6	003063	Tyre pressure - Check	
7	004123	Front wheel - change	
8	002011	Odometer drive- Replacement	
9	002049	Odometer cable - Replacement	
10	002051	Odometer transmission complete - change	

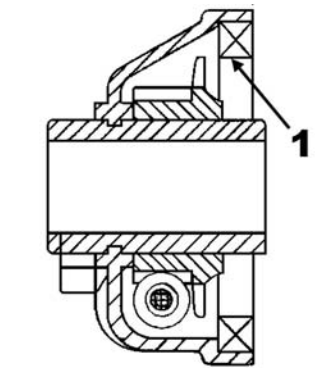
Grease tone wheel or movement socket

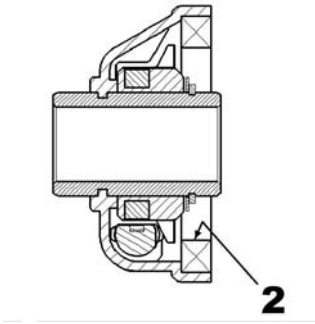
Please take note that the code has been introduced:

900001 - Grease tone wheel / movement socket - 15'.

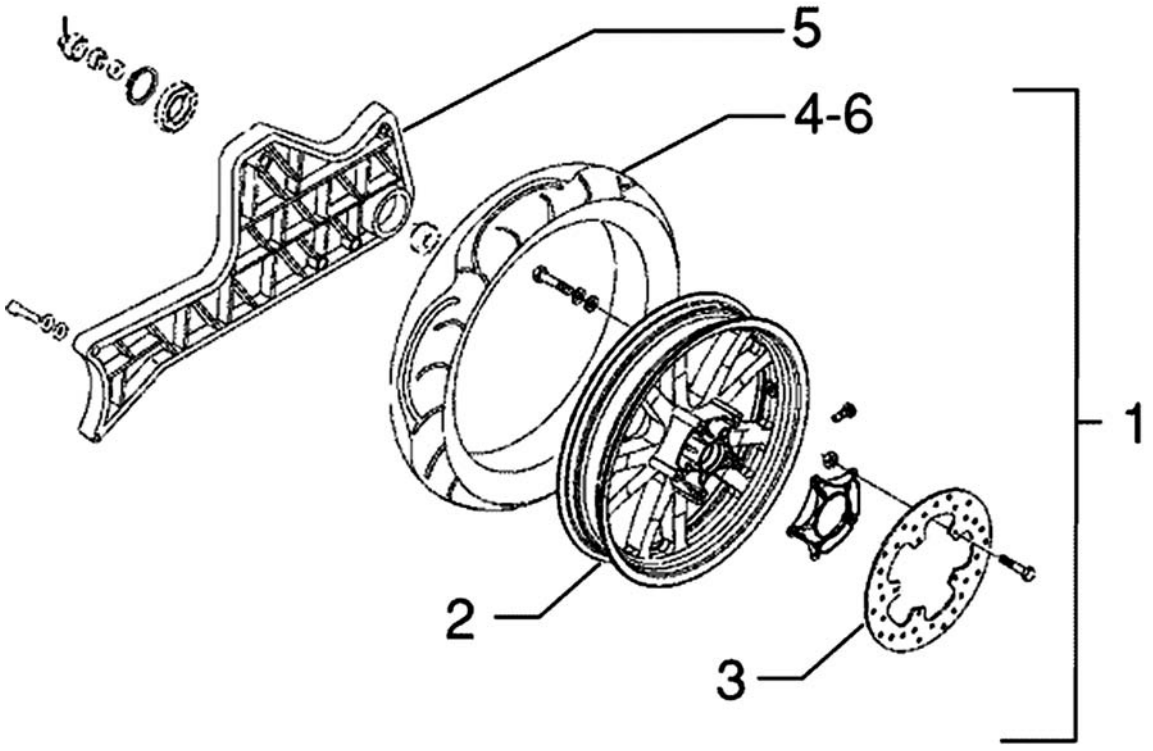
Remember to not mistake the codes 002011 (movement drive replacement) and 005089 (tone wheel replacement) in the event of noise of the indicated components. The grease recommended is TUTELA MRM 2 (molybdenum bisulphide grease and lithium soap).

In the following points we indicate with an arrow the area to be greased (1 - Movement socket, 2 - Tone wheel)





Rear wheel



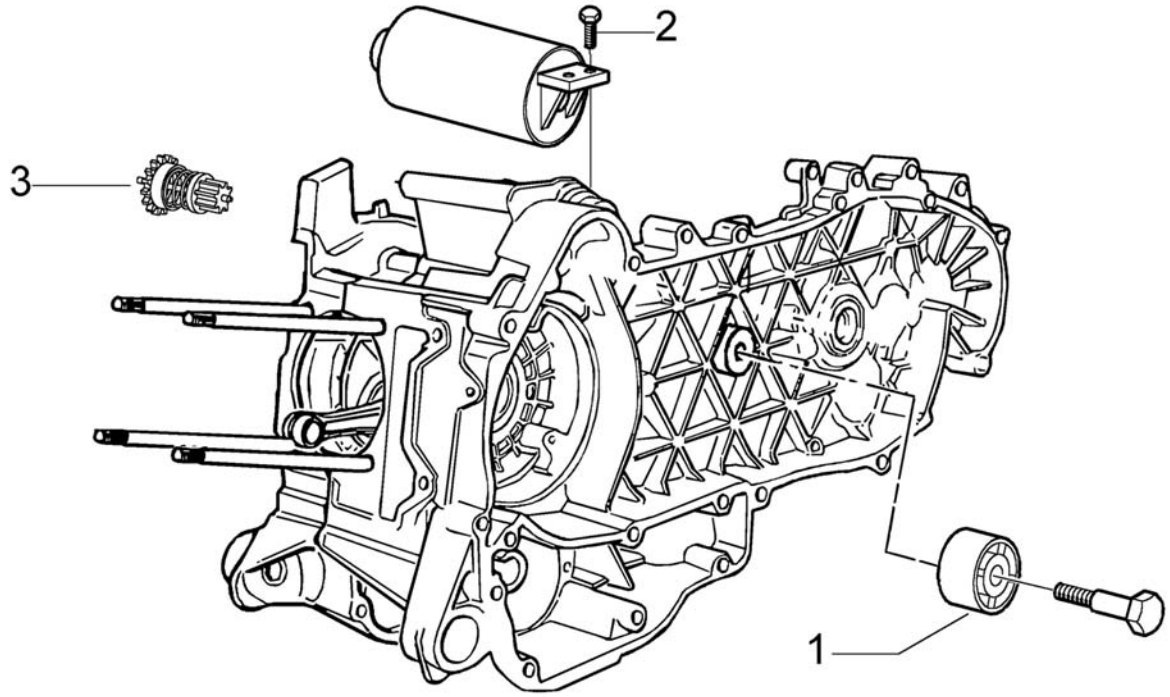
REAR WHEEL

	Code	Action	Duration
1	001016	Rear wheel - change	

	Code	Action	Duration
2	001071	Rear wheel rim - remove and install	
3	002070	Rear brake disc - change	
4	003063	Tyre pressure - check	
5	003077	Silencer/rear shock absorber support arm - overhaul	
6	004126	Rear wheel tyre - change	

Electric start

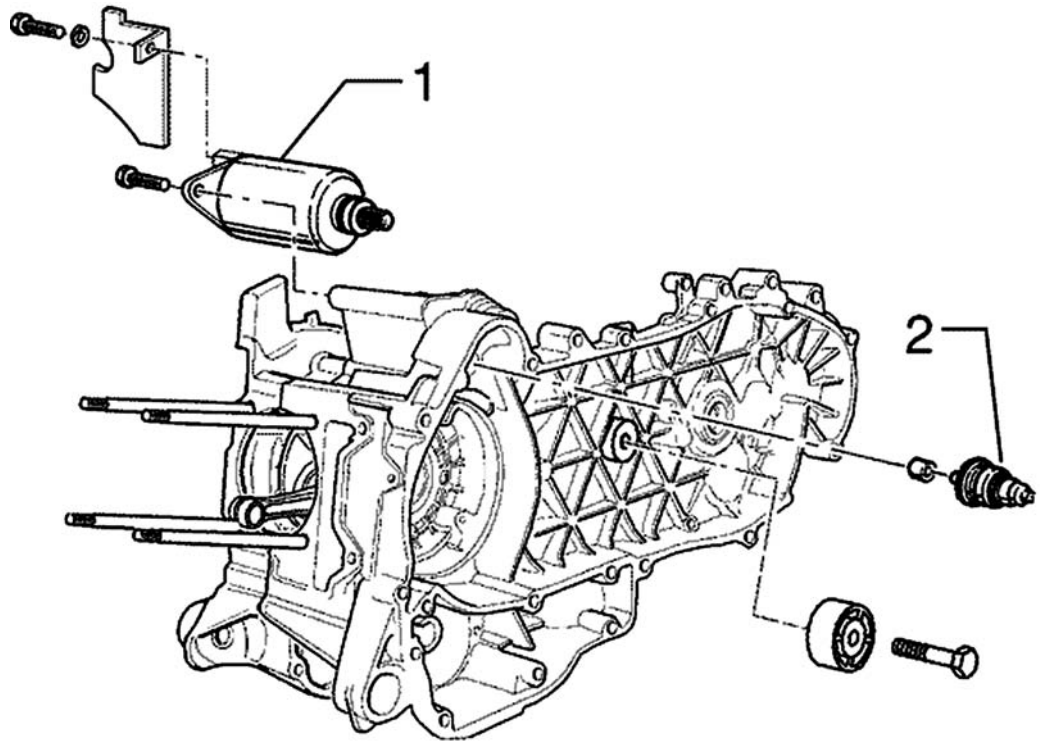
Versione 250



ELECTRICAL START UP

	Code	Action	Duration
1	001141	Belt anti-vibration roller - change	
2	001020	Starter motor - change	
3	001017	Starter pinion - change	

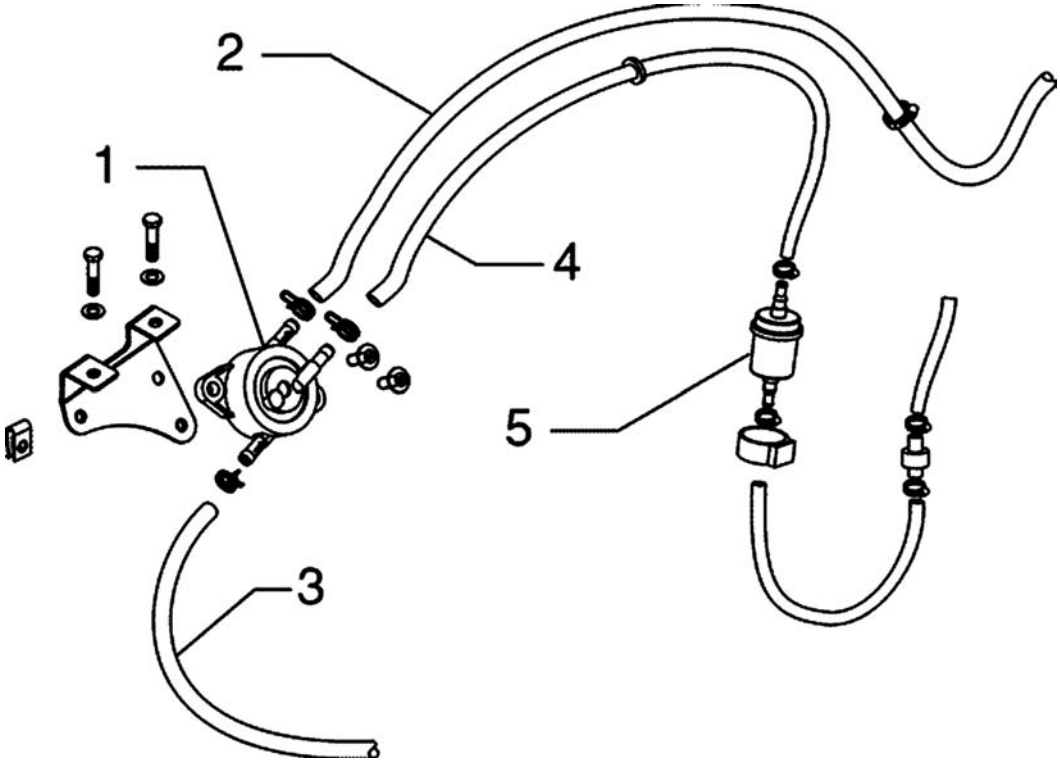
Versione 125



ELECTRIC STARTER

	Code	Action	Duration
1	001020	Starter motor - Replacement	
2	001017	Starter pinion - Replacement	

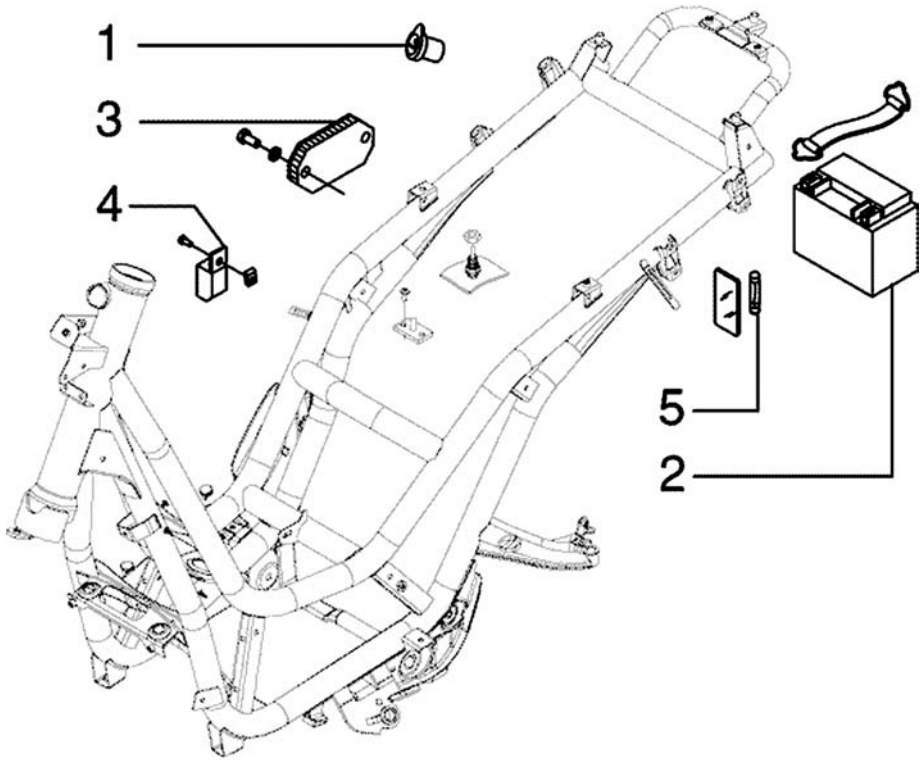
Fuel pump



FUEL PUMP

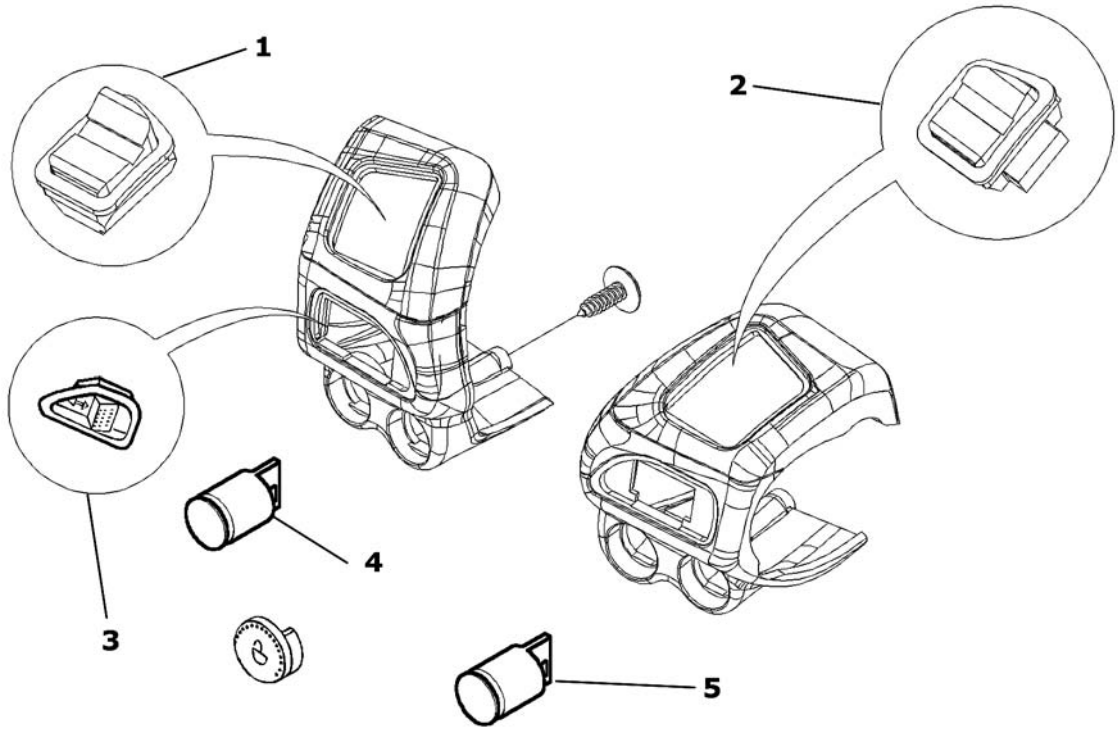
	Code	Action	Duration
1	004073	Fuel pump - Replacement	
2	004137	Fuel pump tube - Replacement	
3	004086	Vacuum fuel pump tube - Replacement	
4	004089	Pump-tank pipe - Replacement	
5	004072	Fuel filter - Replacement	

Electric devices



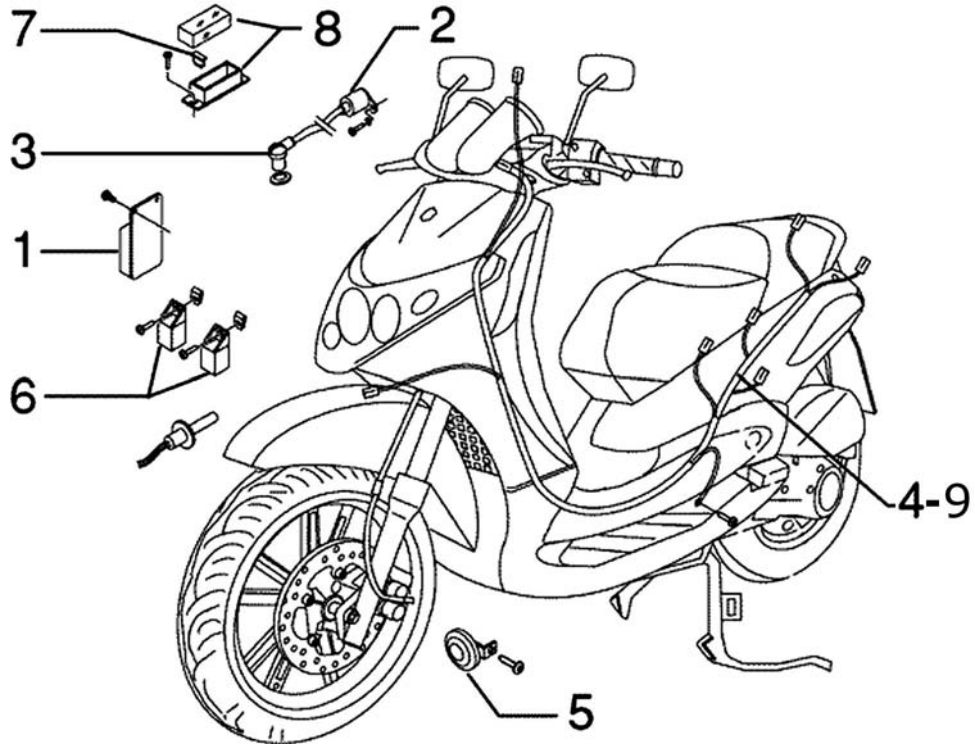
ELECTRICAL DEVICES

	Code	Action	Duration
1	004142	Plug socket - change	
2	005007	Battery - change	
3	005009	Voltage regulator - Replacement	
4	005011	Start-up remote control switch - change	
5	005026	Helmet compartment bulb - change	



ELECTRICAL DEVICES

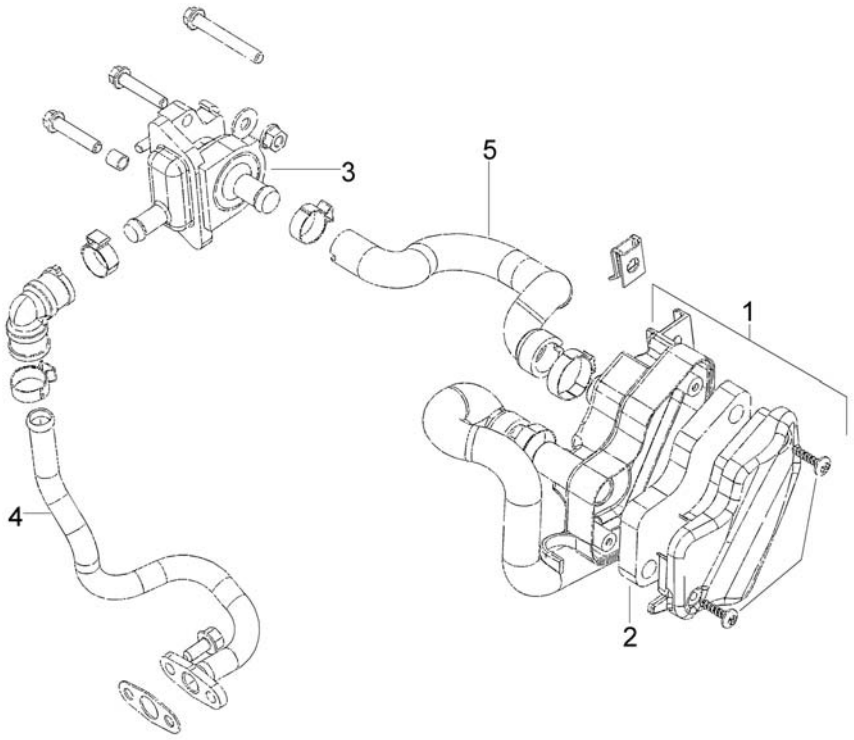
	Code	Action	Duration
1	005039	Light switch - Replacement	
2	005077	Emergency stop switch - Replacement	
3	005006	Light switch or turn indicators - Replacement	
4	005040	Horn button - change	
5	005041	Starter button - Replacement	



ELECTRICAL DEVICES

	Code	Action	Duration
1	001023	Electronic control unit - Replacement	
2	001069	H.V. coil - change	
3	001094	Spark plug hood - change	
4	005003	Horn - Replacement	
5	005035	Headlight remote control - change	
6	005052	Fuse (1) - change	
7	005054	Fuse block (1) - change	
8	005114	Electric circuit - overhaul	

Secondary air box



SECONDARY AIR BOX

	Code	Action	Duration
1	001162	Secondary air box - Replacement	
2	001161	Secondary air filter - Replacement / Cleaning	
3	001174	SAS valve - Replacement	
4	001163	SAS valve - head union - Replacement	
5	001164	Engine secondary air manifold - Replacement	